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16. Abstract

(Note: Although this report was prepared prior to congressional passage of the North American Free Trade Agreement [November 17, 1993, in the House, and November 20, 1993, in the Senate; enacted into law on December 8, 1993], the findings remain valid for post-NAFTA infrastructure planning.)

This study analyzes the extent to which the transportation infrastructure of the Laredo-Nuevo Laredo area is—and will be—affected by the increasing flow of commercial traffic. Since 1986, commercial truck traffic crossing the border between Mexico and the U.S. has increased significantly, a result primarily of the over 2,000 maquiladora manufacturing plants now established on the Mexican side of the border. This already escalating commercial traffic is set to expand even more dramatically if the North American Free Trade Agreement (NAFTA) is passed by the U.S. Congress. Accordingly, transportation planners and economists are focusing on the transportation infrastructure of the U.S.-Mexico border region. This study investigates in particular the Texas-Mexico border area—an area that, economists say, will certainly be impacted by the success or failure of these trade arrangements. In looking specifically at the Laredo-Nuevo Laredo crossing—the main port of entry for Mexican freight moving through Texas—this report provides insight into the overall dynamics of the trade issue from the point of view of its transportation impacts in both Texas and Mexico. And by determining causes of traffic increases and factors that may affect future traffic flows, the report also proposes a methodology that could prove useful in estimating future commercial traffic increases.

Finally, Appendix A supplements this report by providing the Mexican perspective on the new Colombia ("Solidarity") Bridge, a new structure located about 20 miles (32.2 km) northwest of Laredo. While this bridge was intended to augment crossings through the Laredo gateway, its current underutilization demonstrates the need for comprehensive binational planning and timed infrastructure investments.

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EFFECT OF THE NORTH AMERICAN FREE TRADE AGREEMENT ON THE TRANSPORTATION INFRASTRUCTURE IN THE LAREDO-NUEVO LAREDO AREA

by

Juan Carlos Espinosa Rescala
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and
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Truck Traffic in Laredo, Texas: A Case Study of Issues and Remedies
Research Project 7-1312

conducted for the

Texas Department of Transportation

by the

Center for Transportation Research
Bureau of Engineering Research
The University of Texas at Austin

November 1993

IMPLEMENTATION STATEMENT

This study attempts to document the extent to which the transportation infrastructure of the Laredo-Nuevo Laredo area will be affected by the increased commercial traffic generated by a free trade agreement. Through its specific case study of this key port of entry, this work could—in addition to illuminating specific issues of policy-analysis value—provide a generic framework for the analysis of other border crossings.

Prepared in cooperation with the Texas Department of Transportation.

DISCLAIMERS

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Texas Department of Transportation. This report does not constitute a standard, specification, or regulation.

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SUMMARY

(Note: Although this report was prepared prior to congressional passage of the North American Free Trade Agreement [November 17, 1993, in the House, and November 20, 1993, in the Senate; enacted into law on December 8, 1993], the findings remain valid for post-NAFTA infrastructure planning.)

This study analyzes the extent to which the transportation infrastructure of the Laredo-Nuevo Laredo area is—and will be—affected by the increasing flow of commercial traffic. Since 1986, commercial truck traffic crossing the border between Mexico and the U.S. has increased significantly, a result primarily of the over 2,000 maquiladora manufacturing plants now established on the Mexican side of the border. This already escalating commercial traffic is set to expand even more dramatically if the North American Free Trade Agreement (NAFTA), a trade pact currently being negotiated between the U.S., Canada, and Mexico that aims to remove import taxes and other trade barriers across North America, is passed by the U.S. Congress. Accordingly, transportation planners and economists are focusing on the transportation infrastructure of the U.S.-Mexico border region. This study investigates in particular the Texas-Mexico border area—an area that, economists say, will certainly be impacted by the success or failure of these trade arrangements. In looking specifically at the Laredo-Nuevo Laredo crossing—the main port of entry for Mexican freight moving through Texas—we hope to provide some insight into the overall dynamics of the trade issue from the point of view of its transportation impacts in both Texas and Mexico.

Very broadly, the study discusses Mexico and U.S. trade relations, the Mexican transportation system infrastructure, important characteristics of the border region, the regional transportation infrastructure, and regulatory barriers to transborder commercial flows. Within this context, the study focuses on the Laredo-Nuevo Laredo metropolitan area, analyzing in particular local economic activity, existing and proposed transportation infrastructure and customs facilities, existing traffic conditions, and transportation problems within the area. Then, by determining causes of traffic increases and factors that may affect future traffic flows, the report proposes a methodology that could prove useful in estimating future commercial traffic increases. Such a methodology could provide a generic framework for analysis at other border crossings.

Finally, Appendix A supplements this report by providing the Mexican perspective on the Colombia ("Solidarity") Bridge, a new structure located 31.7 miles (51 km) north of downtown Laredo. While this bridge was intended to augment crossings through the Laredo gateway, its current underutilization demonstrates the need for comprehensive binational planning and timed infrastructure investments.

CHAPTER 1. INTRODUCTION

1.1. BACKGROUND

Since the late 1980s, U.S.-Mexico cross-border commercial truck traffic has increased significantly, a result primarily of the over 2,000 maquiladora manufacturing plants that have grown up on the Mexican side of the border. This already escalating rate of commercial traffic will no doubt expand even more dramatically once a free trade agreement between the U.S., Canada, and Mexico is successfully negotiated. Accordingly, transportation planners and economists are focusing on the transportation infrastructure of the U.S.-Mexico border region. This study investigates in particular the Texas-Mexico border area—an area that, economists say, will be impacted by the success or failure of these trade arrangements. In looking specifically at the Laredo-Nuevo Laredo crossing—the main port of entry for Mexican freight moving through Texas—this report hopes to provide some insight into the overall dynamics of the trade issue from the point of view of its transportation impacts.

1.2 OBJECTIVES

The key objective of this study was to document the extent to which the transportation infrastructure of the Laredo-Nuevo Laredo area will be affected by the increased commercial traffic generated by a free trade agreement. At the same time, it sought to establish a freight-demand methodology for forecasting import/export traffic flows through the Laredo-Nuevo Laredo area. Such a methodology could serve as the basis for assessing the impact on both the overall state highway system and the specific transportation system within this region. Thus, this work could provide a generic framework for the analysis of key elements of the transportation infrastructure of other border crossings.

1.3 OUTLINE OF THE STUDY

In following a general-to-specific format, this study first provides, in Chapter 2, some background on U.S.-Mexico trade relations. Aspects of Mexico's economic and industrial evolution are discussed, along with important elements of the proposed North American Free Trade Agreement. Chapter 3 describes the existing Mexican transportation infrastructure, while Chapter 4 focuses on the transportation infrastructure of the Texas-Mexico border. Chapter 5 next summarizes present regulatory barriers to transborder commercial traffic.

Turning next to the region used for our specific case study, we analyze the Laredo-Nuevo Laredo metropolitan area with respect to local economic activity, existing and proposed transportation infrastructure, existing traffic conditions, and commercial traffic problems associated with the area. Then, through an examination of the causes of traffic growth and of the factors that may affect future traffic flows, we propose, in Chapter 8, a methodology for estimating future commercial traffic growth. Finally, Chapter 9 presents the conclusions of the study. An important finding underscored in this last chapter is the need for both U.S. and Mexican

policymakers to coordinate their efforts to improve the border's transportation infrastructure. Crossings through the Laredo gateway have now been enhanced in the medium to long term through the construction of the Colombia ("Solidarity") Bridge. (The Mexican perspective on this investment is reflected in the original economic evaluation study described in Appendix A.) The current under-utilization of this structure demonstrates the need for comprehensive binational planning and timed investments. The success of a free trade agreement and, more fundamentally, the growth of this region's economic vitality require that both sides work in unison to overcome existing and anticipated transportation infrastructure problems.

CHAPTER 2. MEXICO AND U.S. TRADE

2.1 BACKGROUND

This chapter discusses some of the historical circumstances that have shaped U.S.-Mexico trade relations. It looks in particular at the proposed North American Free Trade Agreement (NAFTA), the trade pact that will gradually eliminate all tariffs on trade between the U.S., Canada, and Mexico. As policymakers from both the U.S. and Mexico concede, and as this chapter makes clear, the proposed trade agreement will have an enormous impact on the transportation infrastructure of the Texas-Mexico border region.

2.1.1 History of Industrialization in Mexico

During the Spanish colonial period (early 16th to early 19th centuries), Mexico experienced little industrial advance — a consequence primarily of the failure of its sovereign Spain to embrace the new industrial techniques that were revolutionizing the rest of Europe at that time. Mexico's radical topography further impeded industrialization by inhibiting domestic and foreign transportation (Ref 1).

During the second administration of Mexican President Porfirio Díaz (1884 to 1911), Mexico began to take tentative steps toward industrialization. But while railway construction, foreign investment, and the protectionist policy of the government stimulated some industrial growth, the tenacity of an entrenched agrarian system (employment was still 72 percent agriculture-related) effectively checked full-scale development. At the same time, the unequal distribution of wealth inhibited the creation of a domestic market for industrial produce. These circumstances, culminating in the Mexican Revolution of 1910, sharply curbed Mexican industrialization well into the 20th century.

The Depression and World War II prompted the first great wave of industrial expansion in Mexico. With its primary trading countries locked at this time in economic recovery programs or in war-materials manufacturing, Mexico was forced to manufacture for itself products that it had previously imported. The result was a dramatic overhaul of Mexico's economic structure, such that the Mexican government, seeking to protect the national industry from foreign competition, began to impose protective tariffs and import controls. Particularly during the 1950s, Mexico encouraged public- and private-sector investment as a way of diversifying manufacturing production. Under this new economic policy, Mexico's manufacturing grew at an annual average rate of 7.2 percent from 1936 to 1952, and 8.6 percent from 1953 to 1967.

An important element fueling this economic growth in post-war Mexico was the import substitution strategy—a wide-ranging and almost indiscriminate protectionist policy meant to stimulate domestic production and control foreign investment. And while this policy did initially boost manufacturing, it is now seen as the underlying cause of Mexico's loss of international competitiveness. There were several reasons for this loss of international trade status: First, manufacturing production methods in Mexico were inefficient. Second, the goods produced were priced higher than international goods, a disadvantage that limited domestic demand and increased

foreign competition. Third, the strategy focused on domestic markets at the expense of other viable geographic areas (thus ports and borders lost relative economic importance). Finally, industry protection, at least in Mexico's case, tended to promote unemployment and agricultural problems. The net result of the import substitution policy was an expansion of non-capital goods, a reduction of exportable goods from 1958 to 1982, and, again, a loss of international competitiveness.

The failure of this economic strategy, together with Mexico's increasing foreign debt, the high foreign interest rates, the exchange rate overvaluation that discouraged exports and promoted imports, and the collapse of international oil prices in 1981—all these events brought about Mexico's economic crisis of 1982.

In response, the Mexican government undertook in 1983 broad initiatives that sought to reverse economic downturns. Beginning with the De la Madrid administration and continuing today with the Salinas administration, the government has pursued an economic strategy that fosters industrial growth. Specifically, both the "Plan Nacional de Desarrollo" and the "Programa Nacional de Fomento Industrial y Comercio Exterior" seek to accelerate the development of Mexican industry through export-driven growth, an approach that reflects the government's conviction that many branches of Mexican industry cannot benefit economically if they are restricted to the domestic market. The result has been a radical trade policy shift: Mexico, turning away from earlier protectionist policies, now favors export promotion, selective import substitution on capital and intermediate goods, and a diversification of export markets and supply sources (Refs 2, 3).

The strategy to promote industry through export-driven growth targeted four areas: (1) industries having wide and increasing domestic demand (e.g., the agro-industry); (2) industries capable of attracting foreign currency (mainly export industries requiring minimum imports—e.g., food, textile and apparel); (3) industries whose products are widely used and which take advantage of natural resources (e.g., petrochemical and steel industries); and (4) industries that will be the foundation for technological development and structural change (e.g., chemical, steel, electronics, biotechnology, and some segments of the capital goods industry) (Ref 4).

Table 2.1 shows the evolution of Mexico's gross domestic product (GDP) by economic activity from 1981 to 1989. In 1990, the industrial sector accounted for 29.9 percent of the GDP, mining 2.3 percent, manufacturing 22.9 percent, construction 3.4 percent, and electricity and water 1.3 percent (Ref 5).

2.1.2 Industrialization in the Northern Border Area of Mexico

In 1964, Mexico initiated the Border Industrialization Program (BIP), a scheme in which U.S. manufacturers, under limited ownership, were allowed to locate plants in industrial parks along the border. Under this arrangement, which has been dubbed the "twin plants" concept or "maquiladoras," U.S. manufacturers would ship basic components across the border for assembly in Mexico. (The Spanish word "maquila" refers to the production and assembly processes that use essentially unskilled manual operations; "maquiladora" refers to the factory within which these

operations take place.) The maquiladora industry, launched when the BIP was implemented in 1965, had three objectives: (1) promote border industrialization (including foreign investments), (2) stimulate Mexican industry that can furnish commodities or components to foreign owned assembly plants in the border free zone, and (3) reduce Mexico's border unemployment.

Table 2.1 Mexico GDP by economic activity (billions of 1980 pesos)

Main Economic Activities	1981	1982	1983	1984	1985	1986	1987	1988	1989	1989 (%)
Commerce	1,221	1,204	1,110	1,153	1,183	1,101	1,104	1,127	1,157	22.97
Building for hire	309	323	333	347	362	377	385	402	417	8.27
Foods, Beverages and Tobacco	254	265	262	265	275	274	276	276	298	5.91
Transportation	279	255	247	260	268	255	260	265	276	5.49
Educational Services	207	216	232	247	245	255	254	256	259	5.15
Construction	329	305	247	260	267	240	243	239	251	4.98
Metal Products, Machinery and Equipment	231	203	157	172	194	165	171	198	222	4.41
Agriculture	233	221	228	236	249	236	242	229	218	4.33
Chemicals and Petroleum Products	161	165	163	174	184	178	187	191	209	4.15
Other Social and Personal Services	215	217	216	206	210	200	203	203	209	4.14
Medical Services	146	155	160	165	167	163	164	165	169	3.36
Public Administration and Defense	215	217	216	206	210	200	203	162	158	3.13
Total Main Economic Activities	3,801	3,746	3,571	3,690	3,814	3,641	3,692	3,713	3,843	76.28
Total Economic Activities	4,862	4,832	4,629	4,796	4,920	4,732	4,802	4,879	5,038	100.0

Source: Sistema de Cuentas Nacionales de México 1981-87, Tomo I, Resumen General, Instituto Nacional de Estadística, Geografía e Informática (INEGI). For 1988 and 1989, Dirección de Contabilidad Nacional y Estadísticas Económicas, INEGI.

The program enjoyed immediate success. Initiated in Tijuana, the program was extended across the entire northern border over a 12-mile (19.3 km) border strip, and finally to locations throughout Mexico's interior. Within these zones, items could be manufactured, assembled, and transported across the binational border without the usual assessment of import duties. Instead, modest fees were levied against the "value-added" portion of the product or service that originated from a Mexico-based operation (Refs 5, 6).

In 1966, there were 57 maquiladora plants employing a total of 4,257 people. By 1970, there were 120 such plants and 20,327 workers. By 1976, more than 74,000 employees were at work in 448 maquiladoras located along the U.S.-Mexican border. Presently, the maquiladora industry is growing at an annual rate of 10 percent, having peaked at approximately 20 percent through much of the 1980s. In 1990, there were 2,014 plants employing 468,392 workers (Ref 7). Figure 2.1 shows the trend in maquiladora industry growth, with Table 2.2 showing the maquiladora geographic distribution in Mexico by principal cities and states.

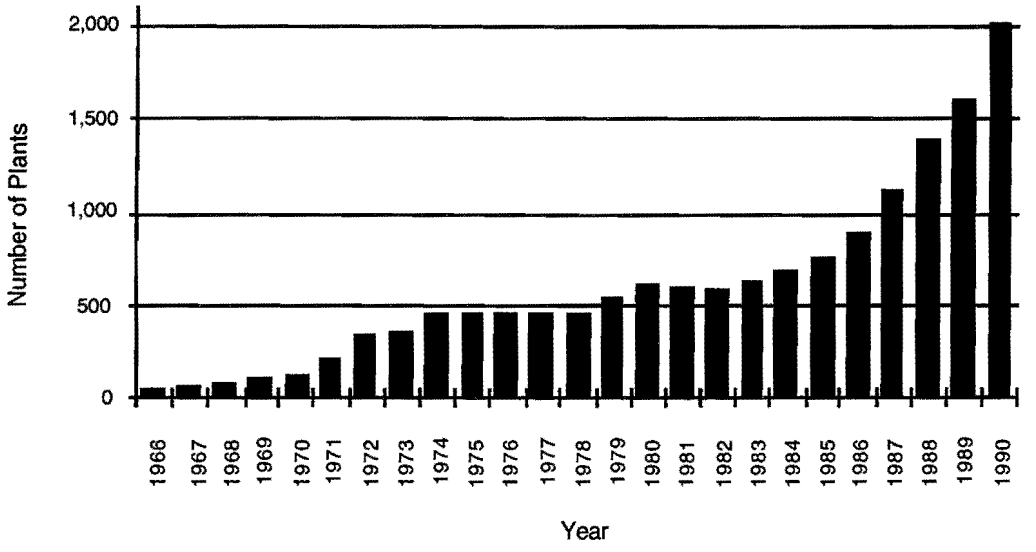


Figure 2.1 Number of plants in maquiladora industries in Mexico

Table 2.2 Maquiladora plants by principal cities and states as of October 1990

STATES & CITIES	PLANTS	JOBS	VALUE ADDED*
NATIONAL TOTAL	**2,014**	**468,392**	**2,862.4**
BAJA CALIFORNIA NTE.	**811**	**96,236**	**583.5**
Ensenadad	37	2,396	9.1
Mexicali	156	22,830	166.1
Tecate	87	5,117	30.2
Tijuana	531	65,893	378.0
BAJA CALIFORNIA SUR	**13**	**1,132**	**2.9**
COAHILA	**149**	**34,741**	**133.7**
Cd. Acuña	46	16,039	59.2
Piedras Negras	44	7,965	32.4
Torreón	20	3,528	14.0
Others	39	7,209	27.9
CHIHUAHUA	**382**	**171,468**	**999.0**
Cd. Juárez	292	129,156	777.6
Cd. Chihuahua	63	29,186	171.5
Others	27	13,126	49.8
JALISCO	**43**	**6,726**	**81.4**
Guadalajara	21	5,234	62.0
Others	22	1,492	19.4
MEXICO STATE & MEXICO CITY	**21**	**2,397**	**24.1**
NUEVO LEON	**76**	**15,716**	**122.7**
Monterrey	16	1,510	16.0
Guadalupe	20	4,176	26.4
Others	40	10,030	80.2

* Value added in millions of dollars

Table 2.2 Continued

STATES & CITIES	PLANTS	JOBS	VALUE ADDED*
SONORA	**153**	**39,074**	**194.4**
Agua Prieta	27	6,523	33.3
Nogales	64	18,445	107.8
San Luis Rio Colorado	16	2,229	11.8
Hermosillo	15	4,106	15.1
Others	31	7,771	26.3
TAMAULIPAS	**250**	**80,071**	**601.9**
Matamoros	93	38,305	311.7
Nuevo Laredo	63	15,784	120.1
Cd. Reynosa y R. Bravo	70	24,239	165.3
Others	24	1,743	4.6
OTHER STATES	**116**	**20,831**	**118.3**

* Value added in millions of dollars

Source: Healy, Eric. "Maquilas by the Numbers," *Border Business*. September, 1991: 17.

Table 2.3 shows the Mexican maquiladora exports by type of industry from 1985–1989. As illustrated, the industries having higher participation included electronics, transport equipment, and general manufacturing, with 44, 27, and 11 percent, respectively. Figure 2.2 shows the growth for these three industries from 1985 through 1989.

Table 2.3 Mexico maquiladora exports (billions of dollars)

INDUSTRY	1985	1986	1987	1988	1989
Electronics	2.4	2.7	3.2	4.5	5.6
Transport Equipment	1.4	1.6	2.1	2.5	3.4
General Manufacturing	0.3	0.4	0.7	1.1	1.4
Furniture	0.1	0.1	0.3	0.4	0.6
Textiles	0.4	0.4	0.4	0.5	0.6
Toys	0.2	0.1	0.2	0.3	0.3
Services	0.1	0.1	0.1	0.1	0.2
Tools	0.1	0.1	0.1	0.2	0.2
Other	0.1	0.1	0.1	0.6	0.3
TOTAL	**5.0**	**5.6**	**7.2**	**10.2**	**12.6**

Source: Banco de México

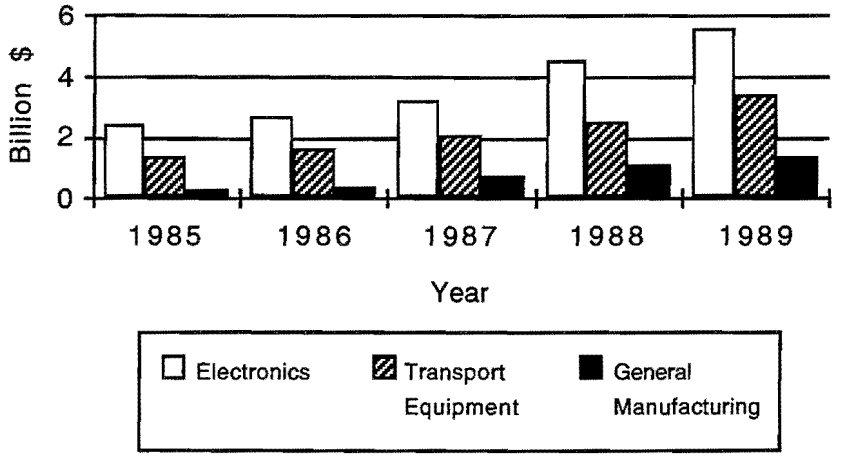


Figure 2.2 Growth of Mexico's main industries in maquiladora exports

2.1.3 Economic Development

As stated earlier, a decline in its international trade status prompted post-war Mexico to abandon its import substitution (protectionist) policy in favor of one based on the production and export of durable consumer goods. There were many problems associated with the earlier protectionist policy. For example, the program, though focused on domestic production, required foreign currency to import raw materials, machinery, equipment, and technology. The level of imports required increasingly greater industrial growth to affect the economic growth of the country. And, as Mexican economists discovered, the higher the industrial growth, the greater the need for foreign currency. For a while, the exports of agricultural products and tourism provided the foreign currency required for the industrial growth. However, in 1966, Mexican agriculture began to decline as a result of the reduced public and private investment occasioned by the industrialization policy. Consequently, Mexico, by the 1970s, increasingly relied on foreign loans, and, hence, incurred substantial foreign debt. A crisis finally occurred in the late 1970s, as oil prices, which Mexico had been using for collateral for borrowing massive amounts of money from foreign banks, fell and interest rates skyrocketed. By 1982, Mexico's oil boom had vanished and the country went into an economic tailspin.

With the administration of De La Madrid, who took office in late 1982, a dramatic turn in economic policy was undertaken, one which pursued export diversification and a more competitive industrial production base. As part of this program, Mexico, in August 1986, joined the General Agreement on Tariffs and Trade (GATT), the multinational trade group established in 1947 to set the world's free-trade rules. With guidance provided by the GATT, Mexico's import licensing system was changed to a tariff system and the tariffs were reduced (even below those associated

with the GATT). Thus, by July 1987 the average tariff rate was 22.7 percent, below the 30 percent figure set by the GATT. By May 1988, the average tariff rate fell to 11 percent (Ref 8).

Mexico also went beyond the GATT requirement that import tariffs not exceed 50 percent (since Mexico does not have existing products with a tariff higher than 20 percent). Furthermore, while the GATT requires that the average import tariff rate not exceed 30 percent, in Mexico that rate is now 9.78 percent. By contrast, the U.S. has an average import tariff rate for Mexican imports of 3.05 percent, but its protectionist practices via tariff dispersion and non-tariff barriers remain significant obstacles to trade with Mexico (Ref 8).

Mexico's change in 1983 to an open economy had a significant impact on Mexican exports. For example, in 1982, before the open economy program, Mexican petroleum exports accounted for 74 percent of total exports, while manufacturing exports represented 16 percent. By 1990, petroleum exports accounted for 33 percent and manufacturing exports represented 55 percent, a result of the 20-percent annual average growth rate for manufactured exports and the 7-percent annual average decrease in petroleum exports brought about by global declines in oil prices. Table 2.4 shows the trend in Mexican exports by sector.

Table 2.4 Mexico exports by sector in millions of dollars (1980-1990)

Item	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Manufacturing	3,571	4,099	3,386	5,448	6,985	6,428	7,782	10,588	12,288	13,014	14,784
%	23	20	16	24	29	30	49	51	60	57	55
Petroleum	9,449	13,305	15,623	14,793	14,968	13,309	5,580	7,877	5,884	7,292	8,921
%	61	66	74	66	62	61	35	38	29	32	33
Agriculture	1,404	1,378	1,097	967	1,306	1,185	1,778	1,295	1,399	1,462	1,723
%	9	7	5	4	5	5	11	6	7	6	6
Remainder	1,089	1,320	1,124	1,104	964	743	891	896	995	998	1,352
%	7	7	5	6	4	4	5	5	4	5	6
TOTAL	15,513	20,102	21,230	22,312	24,223	21,665	16,031	20,656	20,566	22,766	26,780

Source: Banco de México. *Indicadores Económicos*

Despite its open economy, Mexico's imports have not fundamentally changed. In 1982, before the open economy, manufactured imports accounted for 90 percent of total imports, while agricultural imports accounted for 6 percent; by 1990 these figures were a similar 91 percent and 6 percent, respectively. Between 1982 and 1987, imports of manufactured products declined by an average of 4 percent annually, while agricultural imports grew by 1 percent each year, as shown in Table 2.5. As a result of the increase of exports and the decrease of imports, the trade balance in Mexico was positive from 1982 to 1987 (see Table 2.6).

Table 2.5 Mexico imports by sector in millions of dollars (1980-1990)

Item	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Manufacture	16,407	21,037	12,971	6,644	9,122	11,261	10,202	10,771	16,744	20,803	27,026
%	87	88	90	78	81	85	89	88	89	89	91
Agriculture	1,844	2,206	927	1,621	1,696	1,296	783	971	1,397	1,747	1,830
%	10	9	6	19	15	10	7	8	7	8	6
Remainder	646	742	537	286	437	655	447	480	758	860	919
%	3	3	4	3	4	5	4	4	4	3	3
TOTAL	18,897	23,985	14,435	8,551	11,255	13,212	11,432	12,222	18,899	23,410	29,775

Source: Banco de México. *Indicadores Económicos*

Table 2.6 Mexico trade balance in million of dollars (1980-1990)

Item	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Exports	15,513	20,102	21,230	22,312	24,223	21,665	16,031	20,656	20,566	22,766	26,780
Imports	18,897	23,985	14,435	8,551	11,255	13,212	11,432	12,222	18,899	23,410	29,775
Balance	-3,384	-3,883	6,795	13,761	12,968	8,453	4,599	8,434	1,667	-644	-2,995

Source: Banco de México. *Indicadores Económicos*

But while the trade balance was changed from deficit to surplus, the problem of high inflation remained. The Mexican government responded in 1987 by establishing (with social sector representatives) the "Pacto de Solidaridad Economica" (PSE), an agreement that sought to stem increases in consumer prices, salaries, exchange rates, and interest rates. Additionally, the Mexican government attacked inflation by further liberalizing foreign trade. By 1988, the consumer price growth was 51.7 percent—less than one-third the inflation rate of the previous year (159.2 percent). And for 1990, the GDP increase was 3.9 percent and the trade balance deficit increased to about $3 billion, a result of the approximately 27-percent increase on imports and the only 17-percent increase on exports.

2.2 NORTH AMERICAN FREE TRADE AGREEMENT

In many respects, the North American Free Trade Agreement (NAFTA) represents Mexico's continuing commitment to the foreign trade liberalization policy it initiated in 1983. This trade pact, currently being debated by the legislatures of Canada, the U.S., and Mexico, proposes to gradually remove trade barriers among the three countries. The agreement will remove import tariffs, cut customs inspection, and otherwise eliminate the red tape that presently constrains trade between the countries. In its purest form, a free trade pact would mean that goods will cross the U.S.-Mexico border and U.S.-Canada border as easily as they move within the United States

(though the pact's many amendments and restrictions will ensure that trade, while easier, will not be totally free). NAFTA would create the world's largest trading block, with 360 million consumers and a total annual output exceeding $6 trillion. By comparison, the European Community, the second largest, has 340 million consumers and an annual output of $7 trillion. Tables 2.7 through 2.12 and Figure 2.3 present general facts regarding trade between the three NAFTA countries (Ref 9).

Table 2.7 General facts about the U.S., Canada, and Mexico

General Facts	U.S.	Canada	Mexico
Area, in square kilometers*	9,372,610	9,976,140	1,972,550
Coastline, in kilometers**	19,924	243,791	9,330
Population as of July 1991	252,502,000	26,835,036	90,007,304
Population growth rate in 1991	0.8%	1.1%	2.2%
Birth rate per 1,000 population in 1991	15	14	29
Death rate per 1,000 population in 1991	9	7	5
Infant mortality per 1,000 live births in 1991	10	7	29
Life expectancy at birth for male	72	74	68
Life expectancy for female	79	81	76
Telephones per 1,000 people	760	780	96
Television sets per 1,000 people	812	586	124
Radios per 1,000 people	2,120	960	241
Daily newspaper circ. per 1,000 people	259	225	124
Literacy rate	97%	99%	87%

*km^2=.39 square miles

**km=.621 miles

2.2.1 How NAFTA Will Affect Transportation Trends

This section presents the NAFTA provisions that may affect trends in transportation. The provisions include trade in goods and in land transportation.

Trade in Goods

Market Access: These provisions establish trade rules with respect to customs duties and other charges, quantitative restrictions (e.g., quotas, licenses and permits), and import and export price requirements. The provisions improve market access for goods produced and traded within North America.

Table 2.8 Economic indicators for the U.S., Canada, and Mexico

Real Gross Domestic Product (in billions of constant 1985 U.S. dollars)	**1987**	**1988**	**1989**	**1990**	**1991**
U.S.	4,284.3	4,452.8	4,564.4	4,609.7	4,575.7
Canada	400.5	461.0	488.0	483.9	474.1
Mexico	267.5	270.7	279.5	291.8	302.3

Gross Domestic Product (% from previous year)

U.S.	3.1%	3.9%	2.5%	1.0%	-0.7%
Canada	12.3	15.1	5.9	-0.8	-2.0
Mexico	1.7	1.2	3.3	4.4	3.6

Consumer Prices (% from previous year)

U.S.	3.7%	4.0%	4.8%	5.4%	4.3%
Canada	4.3	4.0	5.0	4.8	5.6
Mexico	131.8	114.2	20.0	26.7	22.7

Merchandise Trade Balance (in millions of dollars; parentheses=deficit)

U.S.	(159.5)	(127.0)	(115.9)	(108.1)	(73.6)
Canada	9.0	8.2	6.3	9.2	5.9
Mexico	8.4	1.7	(0.6)	(4.4)	(11.1)

Government Budget Deficit (in billions of US $)

U.S.	147.5	155.5	143.8	218.1	280.6
Canada	15.5	11.7	11.7	15.7	16.5
Mexico	11.9	17.7	10.0	9.1	5.0*

Government Budget Deficit (as % of GDP)

U.S.	3.2%	3.2%	2.7%	4.0%	4.9%
Canada	3.6	2.3	2.1	2.7	2.8
Mexico	13.6	10.2	5.4	4.0	1.9*

Interest Rates — Treasury Bill Rate

U.S.	5.83%	6.67%	8.11%	7.51%	5.41%
Canada	8.15	9.48	12.05	12.81	8.73
Mexico	103.07	69.15	44.99	34.76	19.28

Exchange Rates

Canadian dollars per U.S. dollars	1.3260	1.2307	1.1840	1.1668	1.1457
Mexican pesos per U.S. dollars	1378.2	2273.1	2461.5	2812.6	3018.4

Unemployment Rate

U.S.	6.2%	5.5%	5.3%	5.4%	6.7%
Canada	8.8	7.8	7.5	8.1	10.3
Mexico	3.9	3.5	2.9	2.9	2.6

*Surplus. Source: *Wall Street Journal*, Sept. 24, 1992

Table 2.9 1991 U.S. domestic exports to Canada and Mexico

COMMODITY	Canada (millions of dollars)	Exports to Canada as % of all U.S. exports in this commodity	Mexico (millions of dollars)	Exports to Mexico as % of all U.S. exports in this commodity
Food and live animals	4,239	14.3	2,089	7.1
Beverages	145	3.8	44	1.2
Crude Materials	2,844	11.1	1,624	6.4
Mineral fuels	51	0.4	866	7.2
Chemicals	6,590	15.4	2,622	6.1
Manufactured goods	10,383	29.1	4,420	12.4
Machinery	42,871	22.8	15,061	8.0
Transport equipment	28,004	40.9	4,403	6.4
TOTAL	**79,085**	**19.7**	**32,281**	**8.0**

Source: *Wall Street Journal*, Sept. 24,1992.

Table 2.10 1991 U.S. domestic imports to Canada and Mexico

COMMODITY	Canada (millions of dollars)	Imports to Canada as % of all U.S. exports in this commodity	Mexico (millions of dollars)	Imports to Mexico as % of all U.S. exports in this commodity
Food and live animals	3,941	18	2,502	11.4
Beverages	732	15.2	255	5.3
Crude Materials	6,371	48.9	715	5.5
Mineral fuels	10,325	19.1	4,672	8.6
Chemicals	4,351	18.0	721	3.0
Manufactured goods	15,326	26.7	2,277	4.0
Machinery	40,373	19.2	14,922	7.1
Transport equipment	19,519	24.8	4,306	5.5
TOTAL	**91,064**	**18.7**	**31,130**	**6.4**

Source: *Wall Street Journal*, Sept. 24,1992.

Table 2.11 1991 value of U.S. direct investment position by type of enterprise

Investment Area	Canada (millions of dollars)	Mexico (millions of dollars)	Investment in Canada as % of all U.S. foreign investment in this category	Investment in Mexico as % of all U.S. foreign investment in this category
Manufacturing	32,333	5,837	20.77	3.75
Petroleum	10,912	68	18.83	0.12
Finance	11,680	130	15.15	0.17
TOTAL	**66,856**	**7,079**	**17.90**	**1.90**

Source: *Wall Street Journal*, Sept. 24, 1992 (based on Bureau of Economic Analysis data)

Table 2.12 Work forces of the NAFTA countries (1989)

	U.S.	Canada	Mexico
Size of labor force (employed plus registered unemployed)	128,850,000	13,500,000	31,810,000
Labor force as % of population	50.3	52.0	38.4
Women laborers as % of overall labor force	44.5	43.9	27.8
Working week (hours paid per week per manufacturing worker)	41.0	38.6	47.1
Industrial disputes (working days lost per 1,000 inhabitants per year, 1987-89 average)	28.4	67.6	0.5

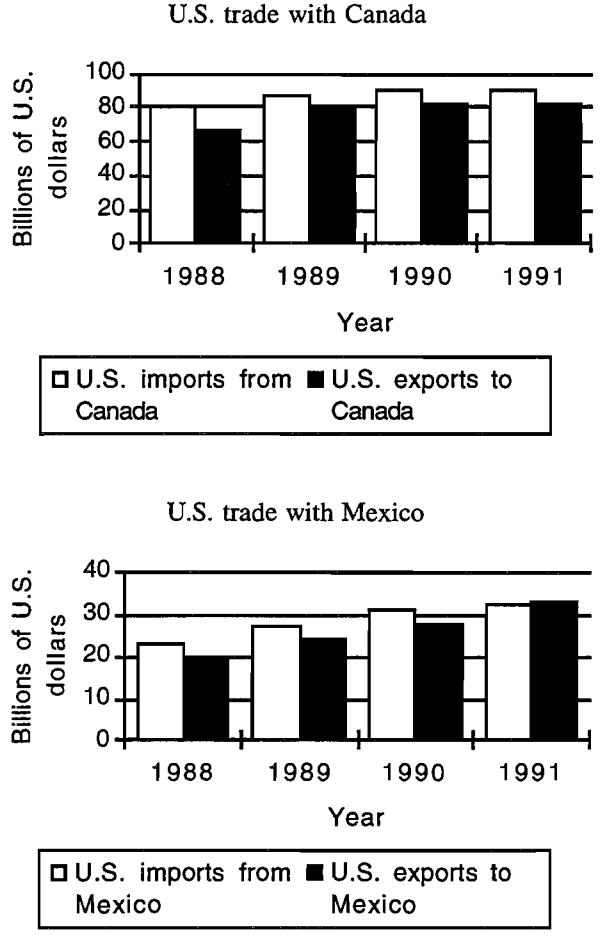


Figure 2.3 Imports and exports between the U.S., Canada, and Mexico (Wall Street Journal, September 24, 1992)

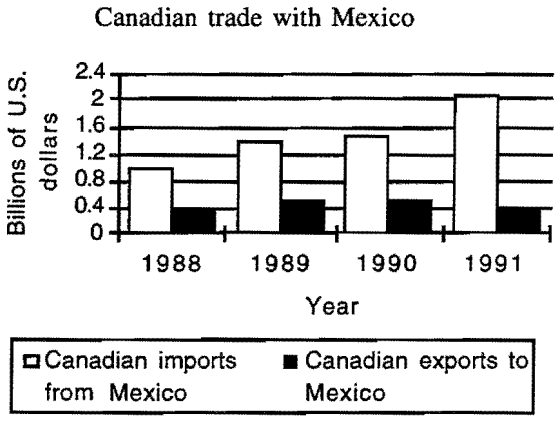


Figure 2.3 Continued

Elimination of Tariffs: Under its rules of origin, NAFTA will progressively eliminate all tariffs on goods qualifying as North American. For most goods, existing customs duties will either be eliminated immediately or phased out in five or ten equal annual stages. For certain sensitive items, tariffs will be phased out over a period of up to 15 years.

Import and Export Restrictions: All three countries will eliminate prohibitions and quantitative restrictions (e.g., quotas and import licenses) applied at the border. However, each NAFTA country maintains the right to impose border restrictions under limited circumstances—for example, to protect the environment or to ensure the safety of humans and other animals. Special rules apply to trade related to agriculture, autos, energy, and textiles.

Agriculture

Regarding the trade of agricultural products, NAFTA establishes two separate bilateral arrangements: one between Canada and Mexico, and the other between Mexico and the United States. (Both include a special transition safeguard mechanism.) When the agreement goes into effect, Mexico and the United States will eliminate immediately all non-tariff barriers to their agricultural trade, generally by converting these barriers to either "tariff-rate quotas" (TRQ's) or to ordinary tariffs.

The TRQ's will facilitate the transition for producers of import-sensitive products in each country. No tariffs will be imposed on imports within the quota amount. The quantity eligible to enter duty-free under TRQ will be based on recent average trade levels and will grow generally at 3 percent per year. The over-quota duty—initially established at a level designed to equal the existing tariff value of each non-tariff barrier—will progressively decline to zero during either a 10- or 15-year transition period, depending on the product.

Automobiles

NAFTA will eliminate trade barriers affecting North American automobiles, trucks, buses and parts within the free trade area. Additionally, it will eliminate investment restrictions in this economic sector over a 10-year transition period.

Elimination of Tariffs: Regarding Mexican imports, the United States will (1) eliminate immediately its tariffs on passenger automobiles; (2) reduce immediately to 10 percent its tariffs on light trucks and phase out the remaining tariffs over 5 years; and (3) phase out over a 10-year period its tariffs on other vehicles.

Regarding Canadian and U.S. imports, Mexico will (1) reduce immediately by 50 percent its tariffs on passenger automobiles and phase out the remaining tariffs over 10 years; (2) reduce immediately by 50 percent its tariffs on light trucks and phase out the remaining tariffs over 5 years; and (3) phase out over a 10-year period its tariffs on all other vehicles.

Each country will eliminate its remaining tariffs on certain automotive parts immediately and will phase out over a 5-year period its duties on other parts (though some phase-out periods will exceed 10 years).

Investment Restrictions: In accordance with NAFTA's investment provisions, Mexico will immediately permit "NAFTA investors" to make investments of up to 100 percent in Mexican "national suppliers" of parts, and of up to 49 percent in other automotive parts enterprises, increasing to 100 percent after 5 years.

Land Transportation

NAFTA provides a timetable for the removal of barriers to land transportation services between NAFTA countries and for the establishment of compatible land transport technical and safety standards. It provides additionally for the phase out of restrictions on cross-border land transportation services among the three countries, a stipulation meant to equalize opportunities in the North American international land transportation market. The provisions are designed to ensure that the land transportation services industries of the three countries will have an opportunity to enhance their competitiveness without being placed at a disadvantage during the transition to liberalized trade.

Bus and Trucking Services: When NAFTA goes into effect, the United States will amend its moratorium on truck and bus operating authority grants by allowing Mexican charter and tour-bus operators full access to the cross-border U.S. market. Mexico will grant equivalent rights to U.S. and Canadian charter and tour-bus operators.

Three years following ratification of the agreement, Mexico will allow U.S. and Canadian truck operators to make cross-border deliveries to, and pick up cargo in, Mexican border states; the United States will also allow Mexican truck operators to perform the same services in U.S. border states. At the same time, Mexico will allow 49 percent Canadian and U.S. investment in bus companies and in truck companies providing international cargo services (including point-to-point distribution of such cargo within Mexico). The United States and Canada will permit Mexican truck companies to distribute international cargo as well. The United States will maintain its

moratorium on operating authority grants for truck carriage of domestic cargo and for domestic passenger service, continuing to allow Mexicans to hold a non-controlling interest in U.S. companies.

Three years after the agreement goes into effect, the United States will allow bus firms from Mexico to begin scheduled cross-border bus service to and from any part of the United States. At the same time, Mexico will provide the same access to bus firms from Canada and the United States.

Six years after the agreement goes into effect, the United States will provide cross-border access to its entire territory to Mexican trucking firms. Mexico will provide the same access to trucking firms from Canada and the United States.

Seven years after the agreement goes into effect, Mexico will allow 51 percent Canadian and U.S. investment in Mexican bus companies and in Mexican truck companies providing international cargo services. At the same time, the United States will lift its moratorium on domestic operating authority for Mexican bus companies.

Ten years after the agreement goes into effect, Mexico will permit 100 percent investment in truck and bus companies in Mexico. No NAFTA country will be required to remove restrictions on truck carriage of domestic cargo.

Rail Services: Under the agreement, Canadian and U.S. railroads remain free to market their services in Mexico, to operate train units using their own locomotives, to construct and own terminals, and to finance rail infrastructure. Mexico will continue to enjoy full access to the Canadian and U.S. railroad systems. The agreement does not affect each NAFTA country's immigration requirements for crews to change at or near their borders.

Port Services: The agreement also liberalizes landside aspects of marine transport. Mexico will immediately allow 100 percent Canadian and U.S. investment in, and operation of, such port facilities as cranes, piers, terminals and stevedoring companies for enterprises that handle their own cargo. For enterprises handling other companies' cargo, 100 percent Canadian and U.S. ownership will be allowed after screening by the Mexican Foreign Investment Commission. Canada and the U.S. will continue to permit full Mexican participation in these activities.

Technical and Safety Standards. Consistent with their commitment to safety, health, the environment, and consumer protection, the NAFTA partners will endeavor to make compatible, over a period of 6 years, their standards-related measures with respect to motor carrier and rail operations, including:

- vehicles and vehicle equipment (tires and brakes, weights and dimensions, maintenance and repair, and certain aspects of emission levels);
- non-medical testing and licensing of truck drivers;
- medical standards for truck drivers;
- locomotives and other rail equipment, and operating personnel standards relevant to cross-border operations;
- standards relating to the transportation of dangerous goods; and

- road signs and supervision of motor carrier safety compliance.

2.2.2 Impacts of NAFTA on the Transportation System

In this section, some of the general impacts of NAFTA on the transportation system are discussed, including (1) growth of trade and traffic; (2) optimization of the freight transportation system, (3) intermodal issues, and (4) the budget problems of the border cities.

Growth of Trade and Traffic: Because growth in trade means growth in traffic, NAFTA is expected to generate certain transportation problems. The border region, particularly, will be affected by this traffic increase, since most of the movement of goods is by surface transportation (i.e., trucks and railroads). Questions have been raised regarding the ability of the transportation infrastructure on both sides of the U.S.-Mexico border to handle the increase of commercial traffic (Ref 11).

The following are the main concerns expressed by government officials and private-sector groups:

- The existing U.S. border inspection facilities cannot adequately accommodate the current flow of commercial traffic. Moreover, the current Capital Improvement Program did not anticipate increased traffic that could result from NAFTA, and no long-range planning process exists for designing, constructing, or renovating border inspection facilities.
- Although U.S. and Mexican Customs have introduced new automated and simplified procedures to speed the flow of commercial traffic, such traffic remains congested.
- U.S. inspection agency staffing along the border has not kept pace with the increase in traffic. Staffing cannot adequately handle existing traffic.
- Adequate transportation infrastructure is required on both sides of the border in order to facilitate the flow of commerce between the countries.
- Most border cities were not designed to handle the existing and expected commercial traffic. The commercial traffic uses city streets whose geometry and structure are inadequate for this purpose; the result is traffic congestion and accelerated pavement deterioration. Furthermore, the mixture of pedestrian and passenger traffic with commercial traffic often leads to accidents. Regional transportation improvement programs should be considered as a possible solution.

Optimization of the Freight Transportation System: The regulatory changes required by the North American Free Trade Agreement could significantly alter the character of present commercial traffic operations. For example, existing U.S.-Mexico motor carrier regulations require that truck tractors (U.S. or Mexican) delivering trailers across the border must return to the originating country with an empty trailer (or with no trailer at all). This requirement leads to an inefficient freight transportation system that generates traffic congestion. The NAFTA provisions on land transportation services are expected to eliminate such requirements and, as a consequence, to decrease truck traffic crossing the border (even though more trade is anticipated).

Intermodal Issues: NAFTA provisions, along with the efforts of the Mexican government to promote the development of port and railroad infrastructure, could also change the pattern and modal share of the commercial flows between the countries. In Mexico's case, the infrastructure's inability to offer double-stack and piggyback services necessitated that cargo be moved primarily by truck. However, American President Companies, one of the major U.S. maritime shipping lines, has committed itself to providing, in conjunction with Southern Pacific, double-stack container service from Detroit to Mexico (Ref 12). This service would complement Union Pacific's own "Double Eagle" double-stack service from Chicago to Mexico City, now operating three services per week. In addition, other railroads (like Southern Pacific) are helping FNM build intermodal yards in Monterrey and in other cities.

Regarding its ports, Mexico is upgrading its industrial ports to include intermodal facilities. For example, the port of Veracruz, on the Gulf coast, is now equipped to handle containerized cargo, so that rail and truck cargo could be shifted to the port of Houston.

Budgetary Burden to the Border Cities: State and local officials have expressed concern over current budgetary burdens and the potential impact of the NAFTA on transportation infrastructure. Texas, for example, is seeking federal funding to help it meet infrastructure transportation requirements along the border. In addition, major border port communities have requested federal and state funding to upgrade local roads.

2.3 SUMMARY

This chapter focused on Mexico's industrial and economic development as an introduction to U.S.-Mexico trade. It also summarized NAFTA provisions that may affect trends in transportation along the U.S.-Mexico border area. The following chapter describes transborder traffic and Mexico's transportation infrastructure.

CHAPTER 3. MEXICO'S TRANSPORTATION INFRASTRUCTURE

As a result of the import substitution policy adopted by Mexico in the 1950s, the country's industry relocated to large interior metropolitan areas — Mexico City, Guadalajara, and Monterrey, with Mexico City serving as the hub of this industrial activity. Reflecting this shift, Mexican railroads and highways today form a vast network linking all economically important areas to Mexico's major seaports and to twelve U.S. border cities.

Still, the continued increase in trade between the U.S. and Mexico has strained the capacity of Mexico's transportation infrastructure, and analysts are now concerned that these infrastructure problems will effectively limit future trade growth. This chapter provides a brief overview of Mexico's transportation infrastructure and describes how these problems are being addressed.

3.1 FEDERAL ROLE IN TRANSPORTATION INFRASTRUCTURE

Buffeted by the economic downturns of the early 1980s, Mexico has been forced to cut back its investment in transportation infrastructure. From 1982 to 1989, for example, the annual federal investment in transportation decreased by 16 percent. (The distribution of funds for each mode of transportation from 1982 to 1989 is shown in Figure 3.1.) This decline in infrastructure funding has led Mexican officials to investigate alternative funding sources. Thus, in one scheme, the government has been offering toll road concessions to foreign investors, as a way of funding its ambitious highway program.

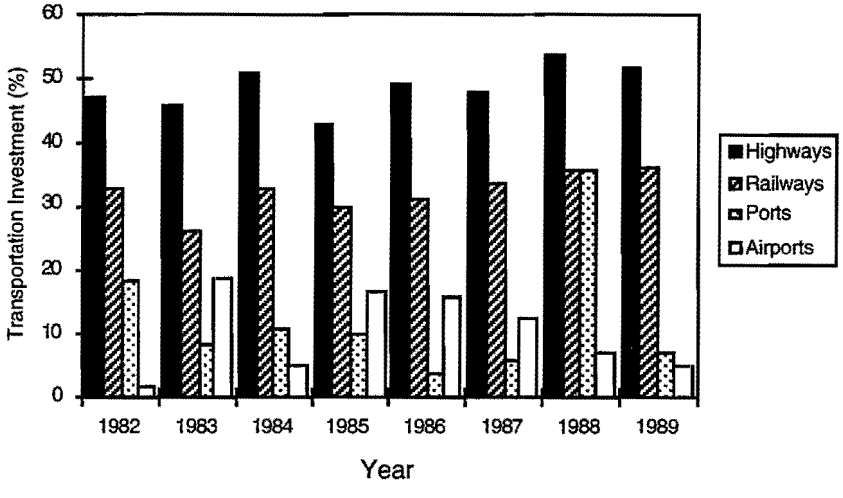


Figure 3.1 Trend in federal transportation infrastructure investment by mode

The following briefly describes Mexico's transportation infrastructure in terms of infrastructure characteristics, operation, and amount and type of cargo moved.

3.2 PORTS

There are thirteen main commercial ports in Mexico—seven on the Pacific coast and six on the Gulf coast. The ports on the Pacific coast include Ensenada, Guaymas, Topolobampo, Mazatlán, Manzanillo, Lázaro Cárdenas, and Salina Cruz; Gulf coast ports include Altamira, Tampico, Tuxpan, Veracruz, Coatzacoalcos, and Progreso (see Figure 3.2). Of the total Mexican port capacity, Gulf ports process approximately 60 percent of all freight, while Pacific coast ports handle the remaining 40 percent. All ports—with the exception of Tuxpan and Ensenada—are connected to the interior by railway. (In Topolobampo, Lázaro Cárdenas, and Altamira, the railway system is under construction.) The ports of Salina Cruz, Lázaro Cárdenas, Altamira, Veracruz, and Coatzacoalcos have specialized terminals to handle containers, as shown in Table 3.1.

Table 3.1 Main Mexican commercial ports (Ref 14)

PORT	**Average Depth (m)***		**Railway**		**Container Crane**
Pacific Coast	Access Channel	Cargo Dock	Harbor	Dock	
Ensenada, B.C.	9.85	8.75	NO	NO	-
Guaymas, Son.	11.75	10.50	YES	YES	-
Topolobampo, Sin.	11.00	10.00	YES	Under construction	-
Mazatlán, Sin.	10.75	9.00	YES	YES	-
Manzanillo, Col.	14.00	13.00	YES	YES	-
Lázaro Cárdenas	14.00	13.00	YES	Under construction	1
Salina Cruz, Oax.	13.00	10.50	YES	YES	1
Gulf Coast					
Altamira, Tamps.	13.00	13.00	YES	Under construction	1
Tampico, Tamps.	10.00	10.00	YES	YES	-
Tuxpan, Ver.	7.20	6.50	NO	NO	-
Veracruz, Ver.	13.00	9.50	YES	YES	1
Coatzacoalcos, Ver.	11.00	10.00	YES	YES	1
Progreso, Yuc.	5.00	5.00	YES	YES	-

*m=3.28 feet

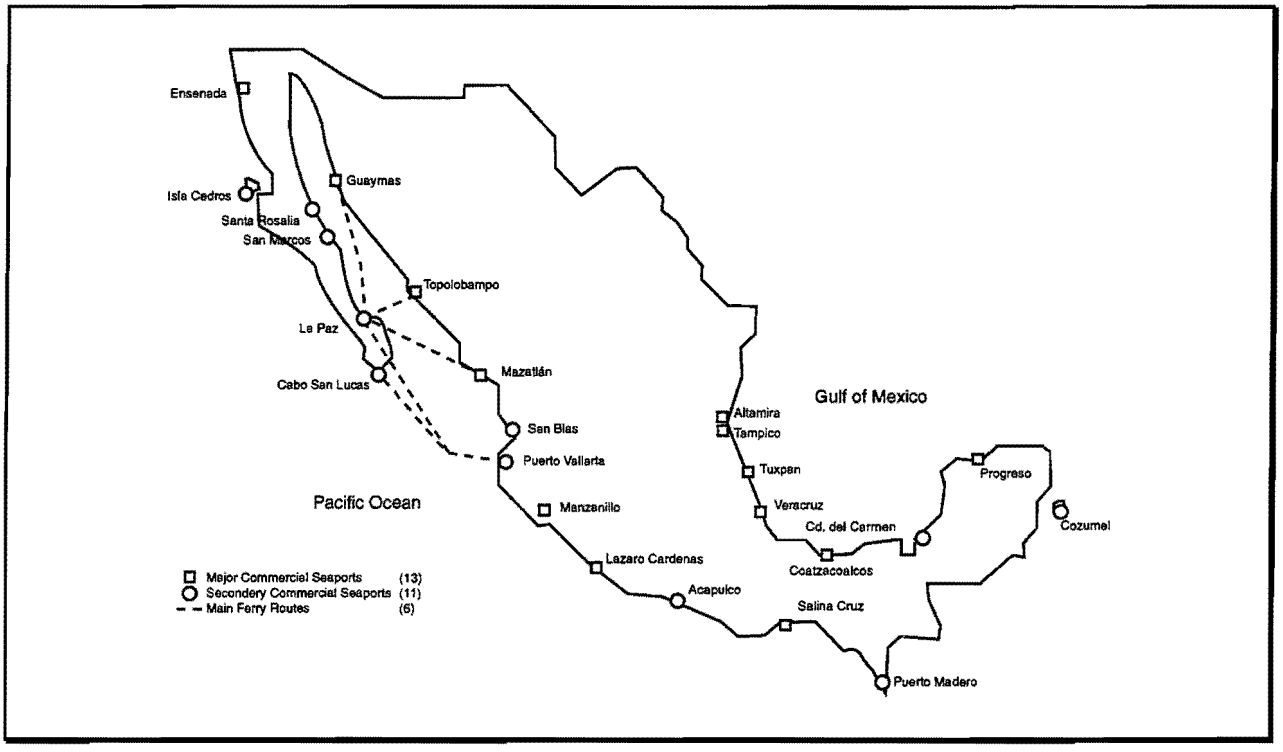


Figure 3.2 Main commercial seaports in Mexico

In terms of cargo processed at Mexican ports, Mexico (as of 1989) exports to the U.S. about 50 million tons (45.3 million Mg) and imports 10.7 million tons (9.7 million Mg), representing 57 percent and 61 percent of total exports and imports, respectively. The balance, in terms of cargo volume with the U.S., is favorable to Mexico, since exports are 4.7 times greater than imports.

As of 1988, the three largest commodities imported (for total cargo volume) were petroleum and related products (29.2 percent), corn (13.9 percent), and fertilizers (13.7 percent); the three largest commodities exported were petroleum and related products (80.1 percent), salt (5.9 percent), and cement (3.1 percent). Table 3.2 shows total cargo processed at Mexican ports in 1989.

Table 3.2 1989 Total cargo classification at Mexican ports (Ref 14)

Commodity	Imports (1,000 tons)*	%	Exports (1,000 tons)*	%
General Cargo	2,675	15.4	2,768	3.2
Grains	5,124	29.5	568	0.7
Minerals	3,525	20.3	12,287	14.1
Petroleum Prod.	5,457	31.4	69,867	80.3
Other	578	3.3	1,512	1.7
Total	17,359	100.0	87,002	100.0

*ton=.907 Mg

Containerization at Mexican ports increased almost threefold from 1979 to 1982, before slowing to a growth rate of about 3.7 percent in 1986. Growth from 1986 to 1989 was again rapid, with containerized cargo representing 40 percent of the total general cargo moved in 1989. Table 3.3 shows containerized cargo growth by port. In 1989, Mexico's container fleet ranked thirtieth worldwide, with 16,667 twenty-foot (6-m) equivalent units (TEUs). By contrast, the U.S. ranked first, with 3.2 million TEUs.

Puertos Mexicanos, the Mexican port authority, coordinates freight movement for all major companies operating at major Mexican ports (an exception is Veracruz, which is operated by the port labor union). Port services are subject to rate regulations pertaining to maximum and minimum rates (a strategy to block price competition); labor unions also tend to limit productivity and to increase operating costs.

When high demand threatens port capacity, Puertos Mexicanos rations port services, giving priority to the earliest requests. Such rationing can create serious logistical problems, especially when congestion disrupts operations at the Veracruz and Tampico-Altamira ports (there is no rail connection between them, and the lack of highway capacity limits the use of these ports).

Table 3.3 Evolution of containerized cargo at Mexican ports (thousands of tons) (Ref 14)

Port	1984	1985	1986	1987	1988	1989
Veracruz	268.3 (29.5%)	340.2 (33.2%)	315.3 (27.4%)	405.7 (26.5%)	576.0 (29.4%)	773.5 (35.2%)
Tuxpan	156.5 (17.2%)	188.1 (18.4%)	206.4 (17.9%)	219.6 (14.3%)	227.2 (11.6%	328.1 (15.0%)
Altamira	-	-	56.4 (4.9%)	64.7 (4.2%)	179.2 (9.1%)	313.3 (14.2%)
Lázaro Cárdenas	41.1 (4.5%)	67.1 (6.5%)	61.1 (5.3%)	88.5 (5.8%)	154.4 (7.9%)	209.3 (9.5%)
Manzanillo	39.6 (4.3%)	40.9 (4.0%)	48.5 (4.2%)	69.0 (4.5%)	163.5 (8.3%)	188.1 (8.6%)
Tampico	224.0 (24.6%)	243.3 (23.7%)	220.3 (19.1%)	297.1 (19.4%)	266.3 (13.6%)	173.3 (7.9%)
Salina Cruz	143.6 (15.8%)	114.3 (11.2%)	213.8 (18.5%)	299.8 (19.5%)	160.9 (8.2%)	145.7 (6.6%)
Guaymas	-	-	9.2 (0.8%)	79.3 (5.2%)	133.7 (6.8%)	40.5 (1.8%)
Coatzacoalcos	33.4 (3.7%)	24.1 (3.4%)	10.3 (0.9%)	1.1 (0.1%)	59.9 (3.1%)	38.2 (1.7%)
Acapulco	1.5 (0.2%)	6.0 (0.6%)	4.4 (0.4%)	5.3 (0.3%)	13.0 (0.7%)	30.5 (1.4%)
Mazatlán	3.0 (0.2%)	0.5 (0.0%)	7.7 (0.7%)	3.4 (0.2%)	21.4 (1.1%)	29.7 (1.4%)
Progreso	-	-	-	-	3.8 (0.1%)	4.4 (0.2%)

On May 31, 1991, the federal government dissolved the labor union at Veracruz and took control of port operations; shortly afterwards, on July 18, 1991, the government changed Article

45 of the maritime commerce law, "Ley de Navegación y Comercio Maritimo," enabling the Secretaría de Comunicaciones y Transportes (SCT) to grant concessions to those seeking to build and to use docks and private facilities at the ports.

3.3 RAILWAYS

The Mexican railroad is a 16,343-mile (26,312-km) network, with 12,617 miles (20,313 km) (77.2 percent) consisting of trunk and link rail lines and the remaining 3,725 miles (5,997 km) (23.8 percent) consisting of auxiliary lines (see Fig. 3.3). Almost 94 percent of the network is standard rail track (the remaining narrow rail track lines are being converted to standard). Because the existing railroad network was largely built in the early 1900s, it requires continuous maintenance and modernization.

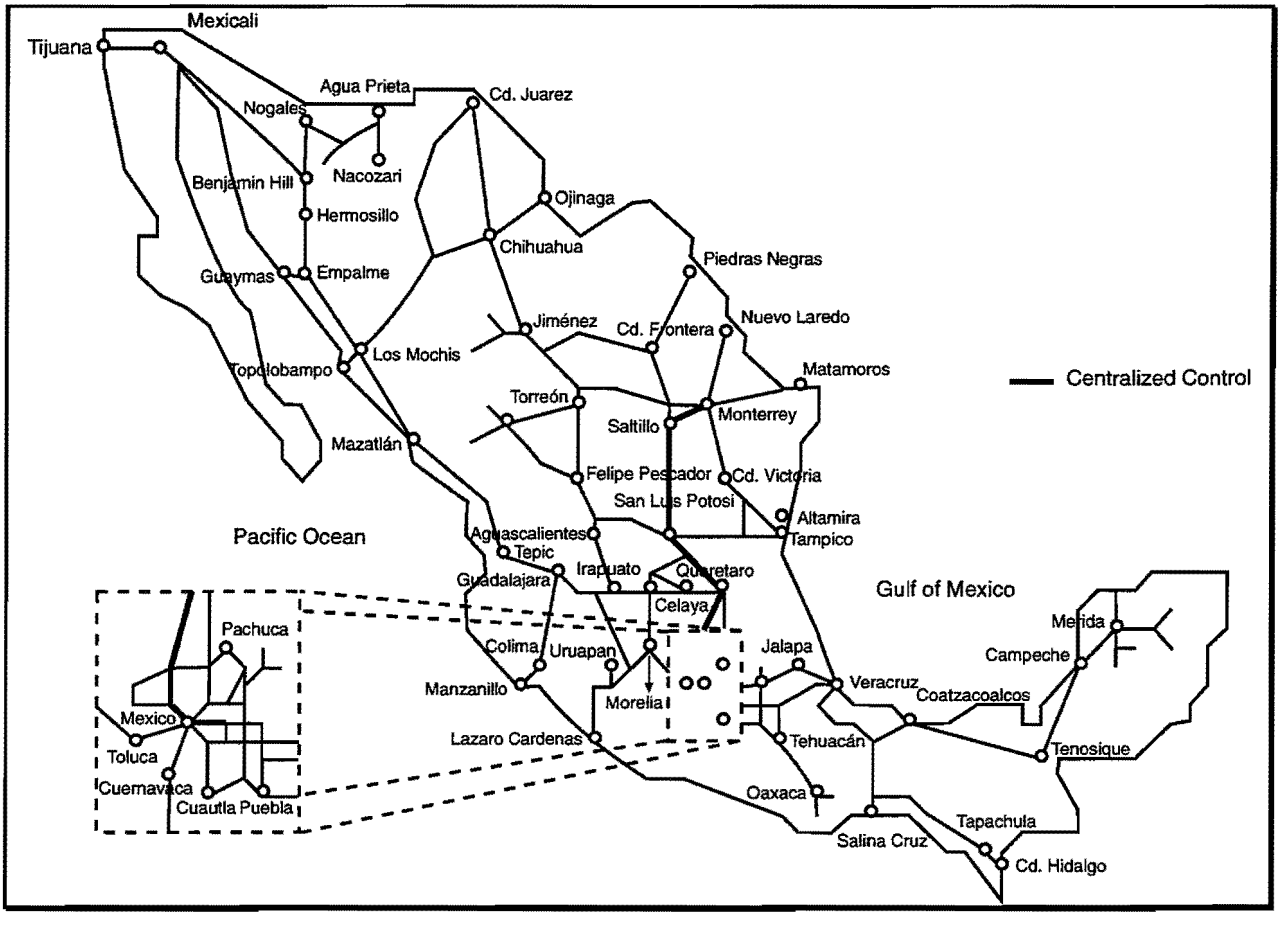


Figure 3.3 Railway infrastructure in Mexico

Approximately 75.2 percent of the rail track is high-caliber steel (100 lb/yd), 27.1 percent of the rail bedding is concrete, and 43.9 percent is continuous elastic track. Except for the Mexico-Querétaro railway (a 152-mile—or 244.7-km—track undergoing conversion to electric power), the

entire network is single track. Of the whole network, only 824 miles (1,326 km) are under centralized control.

The fleet of rail vehicles in Mexico, as of 1989, consisted of 1,737 locomotives, 1,001 passenger cars, and 47,186 cargo cars. Forty percent of the locomotives and 30 percent of the cargo cars are less than 10 years old.

An analysis of 1989 international rail cargo in Mexico shows that 6.9 million tons (6.25 million Mg) arrived by rail and 2.7 million tons (2.44 million Mg) departed by rail. Table 3.4 summarizes the total tons imported and exported by rail port of entry in 1989.

Table 3.4 Total tons imported and exported by rail in 1989 (thousands of tons)

Imports	**Tons* (1,000s)**	**Exports**	**Tons* (1,000s)**
N. Laredo, Tam.	3,945	N. Laredo, Tam.	949
Matamoros, Tam.	1,157	Cd. Juárez, Chih.	573
Piedras Negras, Coah.	988	Piedras Negras, Coah.	409
Cd. Juárez, Chih.	501	Nogales, Son.	305
Nogales, Son.	112	Matamoros, Tam.	213
Ojinaga, Chih.	102	Mexicali, B.C.	160
Mexicali, B.C.	68	Agua Prieta, Son.	8
TOTAL	6,873	TOTAL	2,617

*Ton=.907 Mg
Source: Ferrocarriles Nacionales de Mexico

The main commodities imported by rail in 1989 were agricultural and industrial products, while exports were mainly industrial products (see Table 3.5). Figure 3.4 shows 1988 two-way rail traffic volumes in tons per month for the main corridors (i.e., Mexico-Querétaro, Querétaro-Guadalajara, Querétaro-Monterrey-Nuevo Laredo, and Gomez Palacio-Monterrey).

Rail service in Mexico is provided by Ferrocarriles Nacionales de Mexico (FNM), the state-owned industry that, in effect, operates as a monopoly. Although FNM offers piggyback and container services, such services are confined to small segments of the system. Recently, FNM has been considering improving the system by offering double-stack container service.

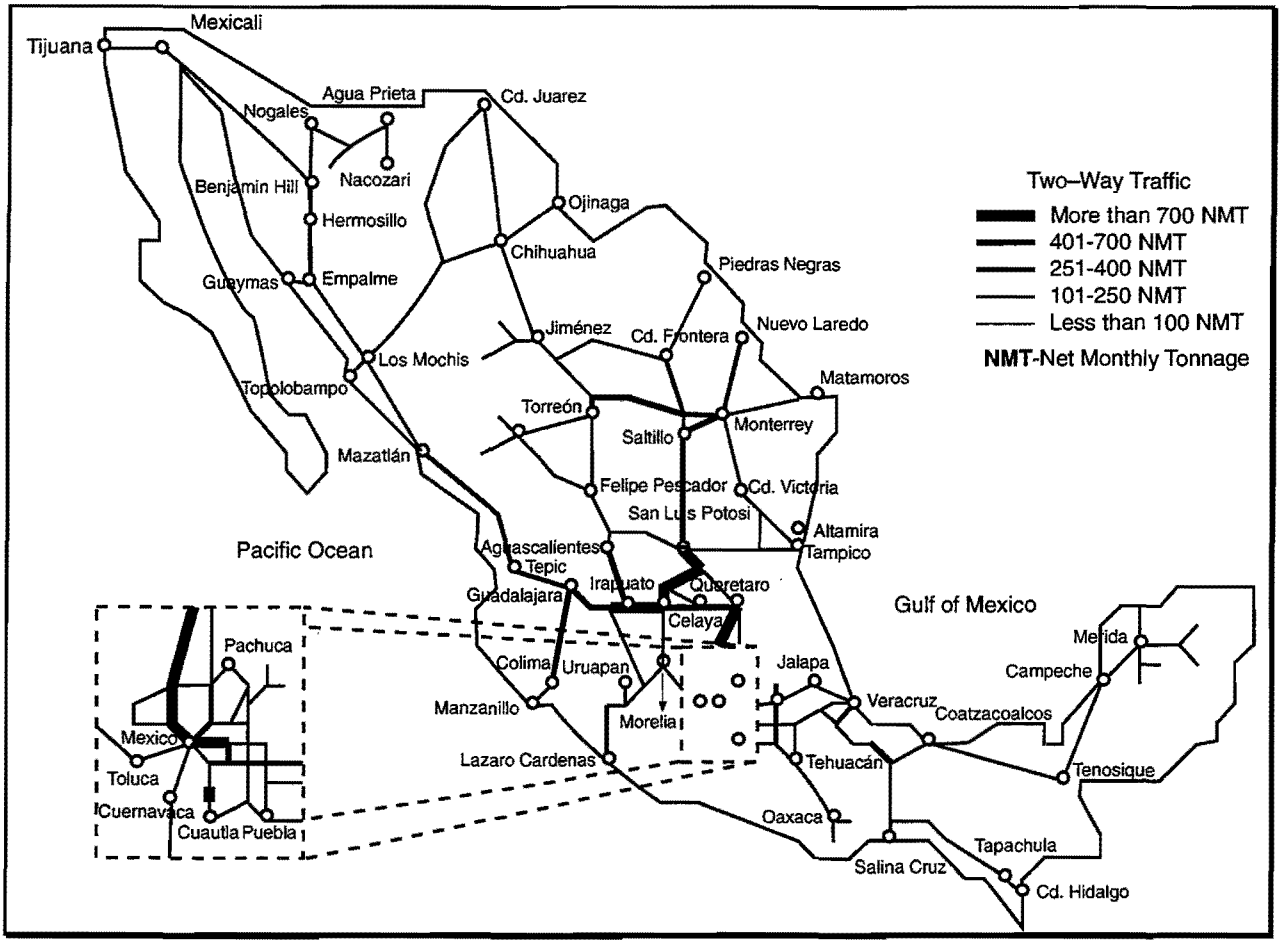


Figure 3.4 Mexico's two-way railway traffic (net monthly tonnage)

Table 3.5 Main commodities transported by rail in 1989 (thousands of tons)

Imports	Ton* (1,000s)	%	Exports	Ton* (1,000s)	%
Sorghum	1,050	15.3%	Cement	820	30.9%
Paper waste	751	10.9%	Vehicle spare parts	221	8.3%
Corn	560	8.1%	Vehicles	207	7.8%
Soy bean	430	6.3%	Beer	188	7.1%
Scrap iron	351	5.1%	Paper	131	4.9%
Chemical products	345	5.0%	Fluorite	121	4.6%
Fodder	303	4.4%	Mineral Coal	99	3.7%
Coke	262	3.8%	Zinc	79	3.0%
Auto spare parts	235	3.4%	Chemical products	67	3.5%
Wood pulp	223	3.2%	Sodium sulfate	53	3.0%
Clay	162	3.4%	Piggy-back and containers	44	1.7%
Rice	147	3.1%	Barite	42	1.6%

*Ton=.907 Kg
Source: Ferrocarriles Nacionales de Mexico

3.4 HIGHWAYS

The highway system in Mexico is a 146,975-mile (236,630-km) network, of which 34.6 percent consists of paved roads and 65.4 percent consists of unpaved roads. Of the paved roads, 94.2 percent are two lanes, and 5.8 percent are four or more lanes. Figure 3.5 shows the road network configuration.

Officially, the highway network is composed of 29,100 miles (46,851 km) of trunk highways, 37,502 miles (60,378 km) of state roads, 59,838 miles (96,339 km) of farm-to-market roads, and 20,534 miles (33,060 km) of dirt roads. In 1989, most of the trunk system—28,337 miles (45,622 km)—was made up of "free roads," while only 763 miles (1,228 km) were toll roads.

According to 1992 figures, there are in the Mexican trunk system 1,959 miles (3,154 km) of four-lane roads, of which 516 miles (831 km) are free roads and 1,443 miles (2,323 km) are toll roads. Figure 3.6 shows the truck annual average daily traffic (AADT) on the road network in 1988.

The SCT's "National Road Program for 1989-1994" (Ref 16) seeks to construct 2,480 miles (3,993 km) of concession highways for the current administration. In order to achieve this goal, the Mexican government has granted the private sector a role in these projects, allowing Mexican firms and foreign investors to finance projects and collect user fees for periods of up to 30 years (after which the project would then revert back to the Mexican government). Whereas previous financing schemes divided costs three ways (23 percent contribution by the government,

28 percent by the concessionaire, and 49 percent by financial corporations), present plans propose that concessionaires pay 30 percent and financial corporations pay 70 percent (with no contribution of federal money).

3.5 SUMMARY

This chapter described Mexico's transportation infrastructure, showing configuration, operational characteristics, and available services provided by each mode of transport. It also described the efforts of the Salinas Administration to improve the transportation system. The following chapter focuses on the U.S.-Mexico border region and the importance of the various border crossings in terms of bilateral trade and transborder commercial traffic by mode of transport. We especially look at the Texas-Mexico border area, analyzing ground and ocean transportation related to U.S.-Mexico commercial traffic.

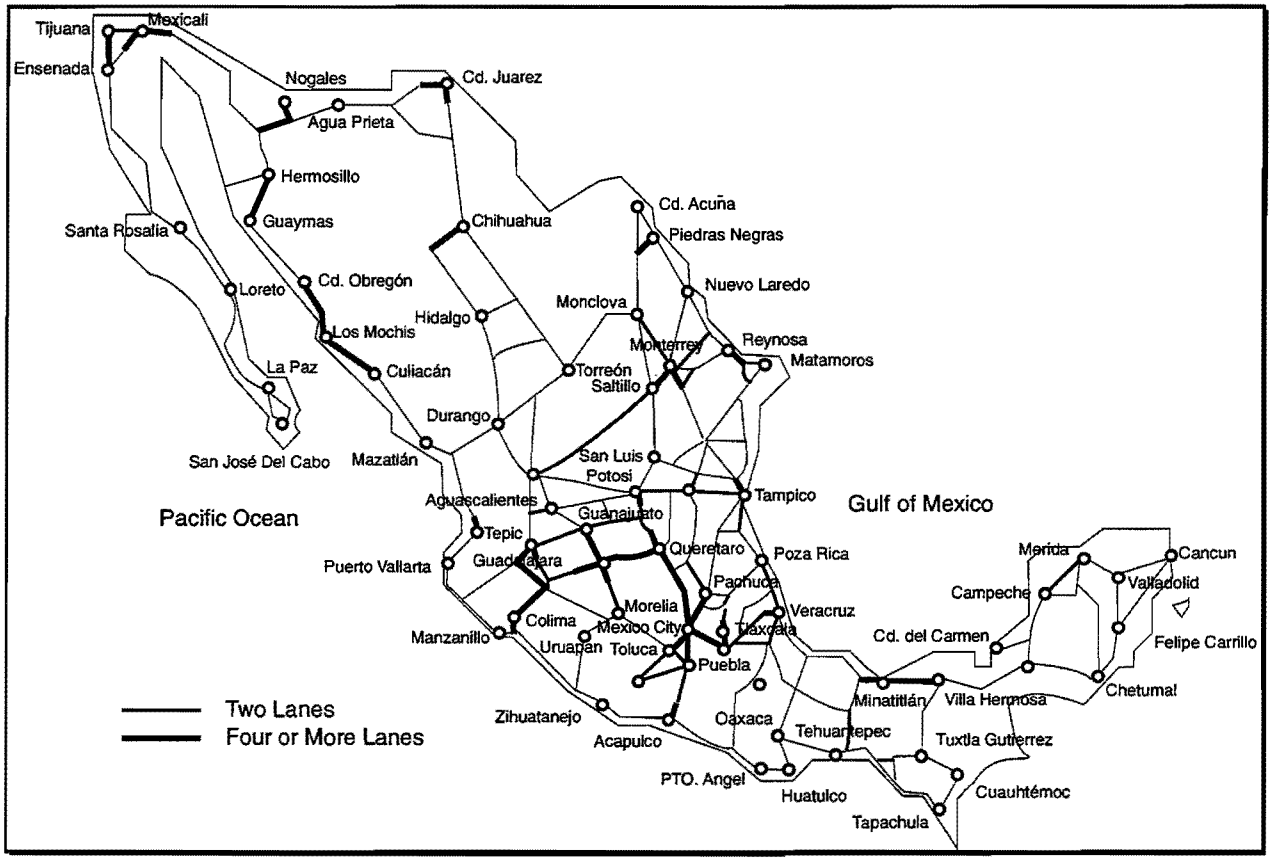


Figure 3.5 Mexico's highway network configuration

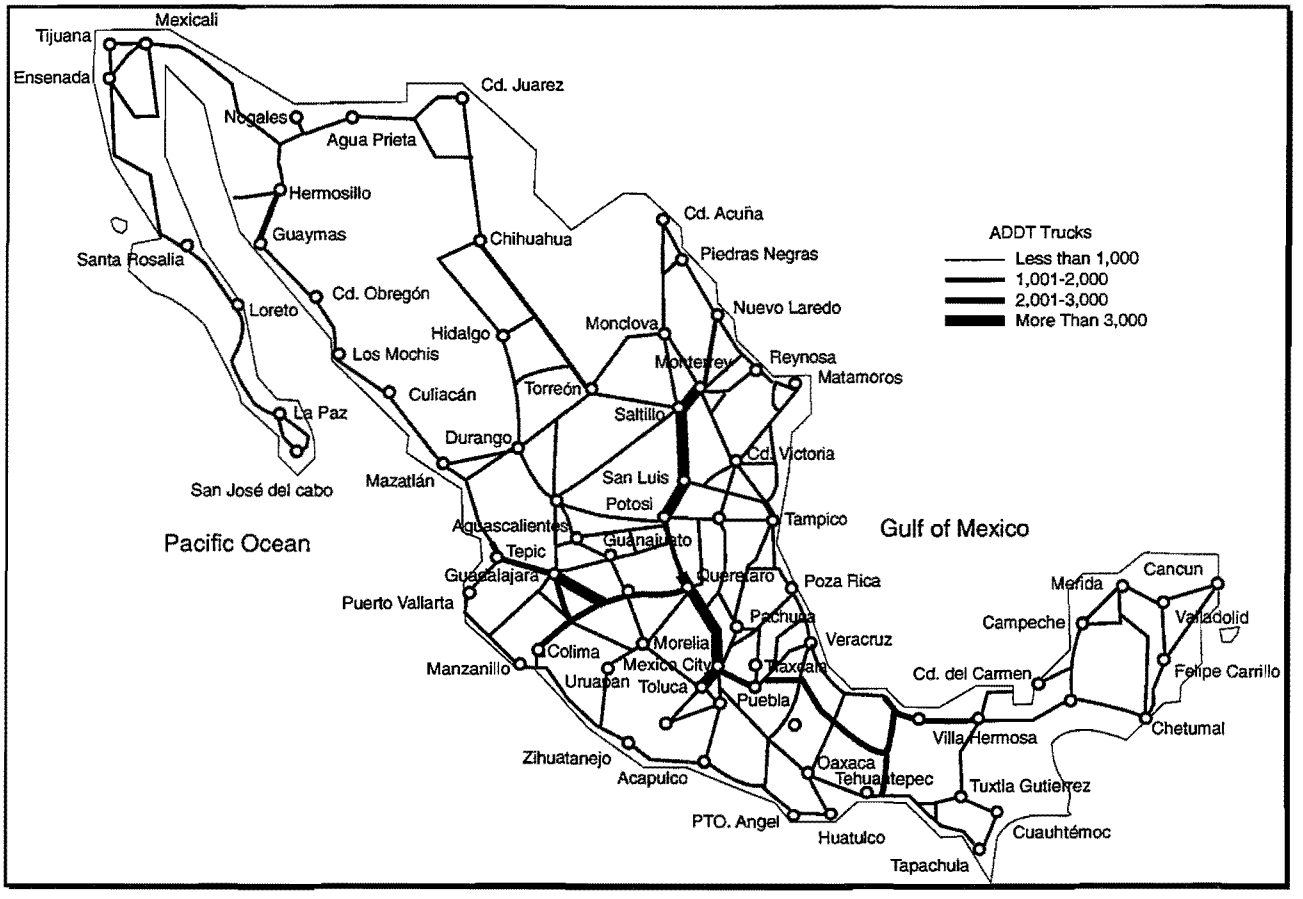


Figure 3.6 Average annual daily truck traffic in Mexico's highway network

CHAPTER 4. U.S. AND MEXICO BORDER REGION

Because the bulk of U.S.-Mexico trade is routed through Texas via surface transportation, the Texas-Mexico border region, especially its transborder transportation infrastructure, has been rightly identified as critical to the success of NAFTA-driven trade ventures (though trade is expected to grow in this area even without a trade agreement). This chapter analyzes problems that may arise as part of the expected increase in commercial flow between the countries.

4.1 AREA DESCRIPTION

The border region is comprised of four U.S. states and six Mexican states. The U.S. states include California, Arizona, New Mexico, and Texas, while the Mexican states are Baja California Norte, Sonora, Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas (see Fig. 4.1).

The border between the U.S. and Mexico extends for more than 2,000 miles (3,220 km) from the Gulf of Mexico, in the east, to the Pacific Ocean, in the west. As of May 1991, there were 40 ports of entry along the U.S.-Mexico border: 24 in Texas, 2 in New Mexico, 8 in Arizona, and 6 in California (Ref 17). Figure 4.2 shows the disposition of these ports, while Table 4.1 provides supplemental information regarding twin-cities, number of international bridges, and number of maquiladora plants.

The U.S. State Department, as the liaison between the U.S. and Mexico, issues bridge permits and coordinates the Intergovernmental Committee on Bridges and Border Crossings that meets four times a year with its Mexican counterparts to discuss issues on specific border projects. While state and local governments are responsible for transportation infrastructure (insofar as it is affected by border traffic), international bridge projects are normally undertaken by border communities.

The economy of the border, historically governed by agriculture, manufacturing, and trade (including retail), has in recent years been dominated by the maquiladora industry. As of October 1990 there were 2,014 maquiladoras generating 468,392 jobs (Ref 20). As shown in Table 4.1, the Texas border area accounts for approximately 30 percent of all maquiladoras and almost 50 percent of the jobs in this industry. California has 38 percent of the plants and 20 percent of the jobs; Arizona has 5 percent of the plants and 6 percent of the jobs. Together, these border states accommodate 73 percent of the maquiladora plants and 76 percent of the jobs. In 1989, the north and southbound maquiladora flows were 1,278 and 1,009 thousand tons, respectively, with the great majority of maquiladora commodities moved by surface modes (Ref 25).

In terms of Mexican bilateral trade, Texas and California (in that order) are the most important states, followed by Arizona and New Mexico. According to the National Trade Data Bank, 66 percent of total U.S. exports to Mexico originate in the four border states: Texas accounted for 46.5 percent, California for 16.6 percent, Arizona for 3 percent, and New Mexico for 0.1 percent. With respect to exports, Mexico is the largest trading partner of both Texas (32.9 percent total exports) and Arizona (18.1 percent total exports); it is California's third largest trading source (8.8 percent total exports) and New Mexico's seventh largest trading source (5.3 percent of

the total exports). The modal share of exports to Mexico by each state is shown in Table 4.2, based on the value of the exports.

The U.S. Customs Service has divided the border region into four Customs Districts, with their centers at Laredo, El Paso, Nogales, and San Diego. The first three belong to the U.S. Customs Service's Southwest Region, while the remaining district belongs to the Customs' Pacific Region. Covering most of south Texas, the Laredo District includes the following major commercial traffic ports of entry: Laredo, Del Rio, Eagle Pass, Roma, Rio Grande City, Hidalgo, Progreso, and Brownsville. With a wide variety of commodities being traded through the district (e.g., automobile parts, maquiladora products, food, and live animals), the Laredo District has the largest workload in commercial traffic among all the districts.

The El Paso District, the second busiest, includes the western portion of Texas and New Mexico. There are four ports of entry—El Paso, Fabens, Columbus, and Presidio, with El Paso handling over 90 percent of the commercial traffic in the district. Major imported commodities include insulated wiring sets for vehicles, television receivers, and motor vehicle seats.

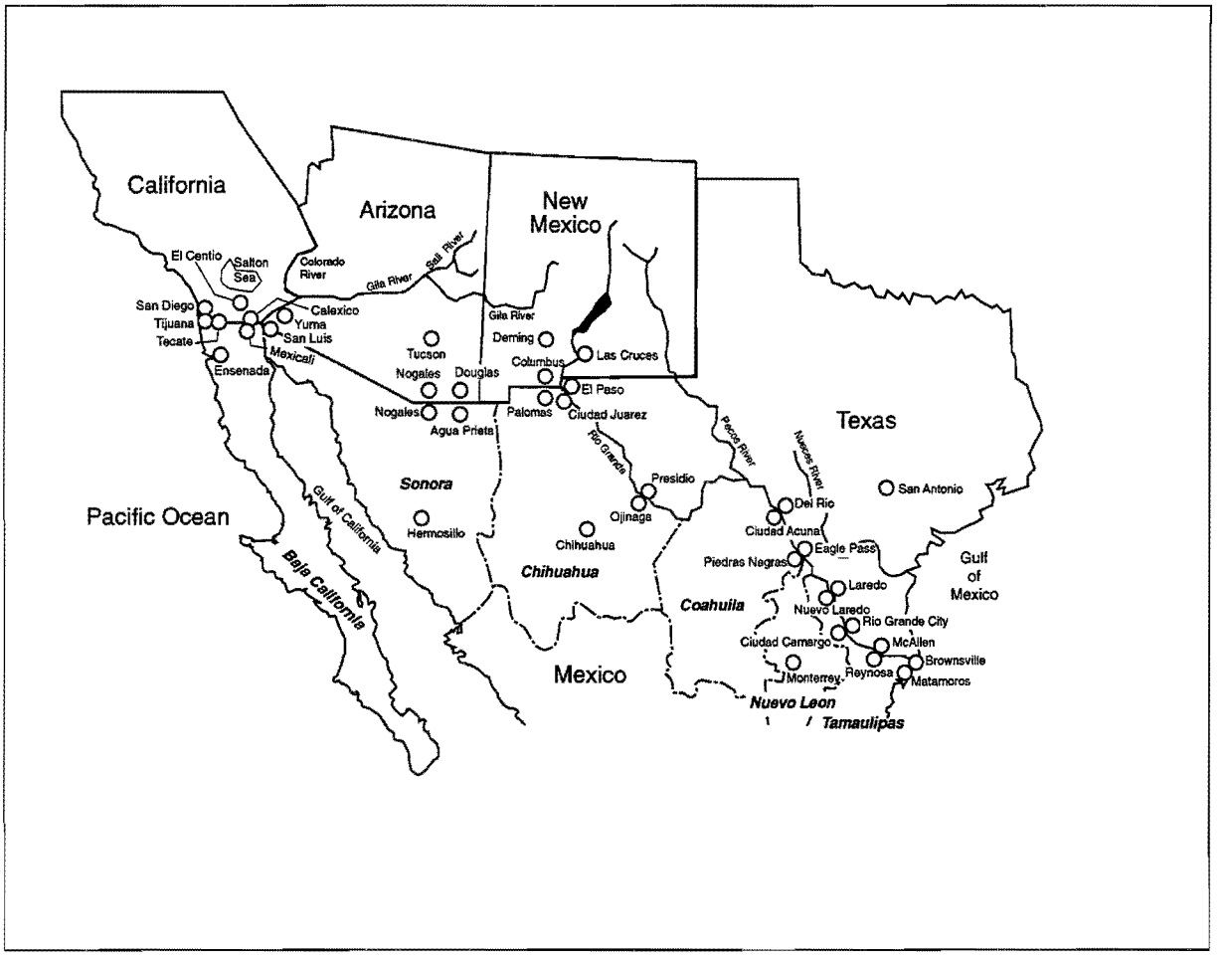
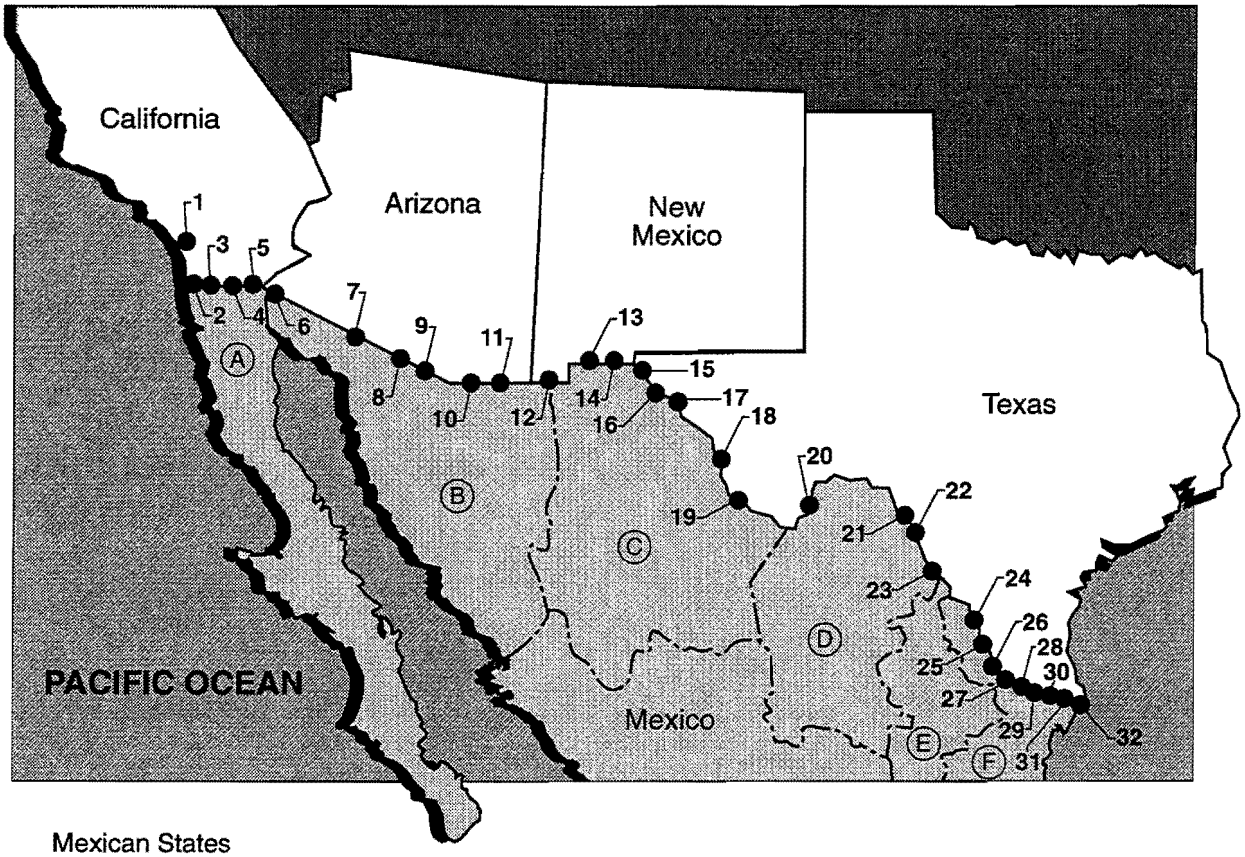


Figure 4.1 U.S.-Mexico border area



Mexican States

A	Baja California
B	Sonora
C	Chihuahua
D	Coahuila
E	Nuevo Leon
F	Tamaulipas

California Border

1	San Diego
2	Otay Mesa/San Ysidro (2)*
3	Tecate
4	Calexico
5	Andrade

Arizona Border

6	San Luis
7	Lukeville
8	Sadabe
9	Nogales (3)*
10	Naco
11	Douglas

New Mexico Border

12	Antelope Wells
13	Columbus
14	Santa Teresa

Texas Border

15	El Paso (5)*	24	Laredo (4)*
16	Ysleta	25	Falcon Dam
17	Fabens	26	Roma
18	Fort Hancock	27	Rio Grande City
19	Presidio (2)*	28	Los Ebanos
20	LaLinda	29	Hidalgo
21	Amistad Dam	30	Progreso
22	Del Rio	31	Los Indios
23	Eagle Pass (2)*	32	Brownsville (2)*

*Number of crossings including highway and rail.

Figure 4.2 U.S.-Mexico border crossings

The Nogales District has the lowest volume of commercial traffic in the U.S.-Mexico border region. About 75 percent of the commercial motor carrier traffic moving through the district is routed through the city of Nogales, the largest port of entry in the district.

The San Diego District includes four ports of entry for commercial vehicles. Major imported commodities include electronics, wood products, and textiles (with much of the commercial traffic related to the maquiladora industry).

Table 4.1 U.S.-Mexico ports of entry (Refs 17, 20, and 26)

U.S.	U.S. Customs District	Mexico	U.S.- Mexico Twin Cities	B(1)	R(1)	T(1)	No. of plants/jobs 1990 (M)
Texas	Laredo	Tamaulipas	Brownsville-Matamoros	2	•	•	93/38,305
			Progreso-Nuevo Progreso	1		•	
			McAllen/Hidalgo-Reynosa	2		•	70/24,239
			Los Ebanos Ferry				
			Rio Grande City-Ciudad Camargo	1		•	
			Roma-Miguel Aleman	1		•	
			Falcon Heights-Nueva Cd. Guerrero				
			Laredo-Nuevo Laredo	2	•	•	63/15,784
		Nuevo Leon	Laredo(Dolores)-Colombia	1		•	
		Coahuila	Eagle Pass-Piedras Negras	2	•	•	44/7,965
			Del Rio-Ciudad Acuña	1		•	46/16,039
			Amistad Dam				
			La Linda (Big Bend)	1			
	El Paso	Chihuahua	Presidio-Ojinaga	1	•	•	
			Fort Hancock-El Porvenir	1			
			Fabens	1		•	
			Ysleta-Zaragoza	2		•	
			Intl. Bridge of the Americas (Cordova)	1		•	
			Stanton Street (Southbound)	1	•	•	292/129,156
			Paso del Norte-Santa Fe (Northbound)	1			
New Mexico			Columbus-Palomas				
			Antelope Wells-El Berrendo				
Arizona	Nogales	Sonora	Douglas-Agua Prieta	1	•	•	27/6,523
			Naco, Arizona-Naco Sonora	1	•	•	
			Nogales, Arizona-Nogales, Sonora	3	•	•	64/18,445
			Sasabe, Arizona-Sasabe, Sonora	1		•	
			Lukeville-Sonoyeta	1		•	
			San Luis-San Luis Rio Colorado	1		•	16/2,229
California	San Diego		Andrade-Los Algodones	1			
		Baja California Norte	Calexico-Mexicali	1	•	•	156/22,830
			Tecate, Ca.-Tecate, Baja California	1		•	87/5,117
			Otay Mesa- Mesa de Otay	1			
			San Ysidro-Tijuana	1	•	•	531/65,893
			Virginia Street-Chaparral	1			
4	4	6					2,014/468,392

NOTE: (1) B = Number of bridges
R = Railway T - Commercial Trucks
M = Maquiladora Industry

Table 4.2 1991 U.S. exports to Mexico by mode of transport

State	Total Value (millions of U.S. dollars)	% by Air	% by Sea	% by Surface
Texas	15,485	2.22	3.85	93.93
New Mexico	342	3.78	0.52	95.70
Arizona	5,474	1.37	0.20	98.43
California	5,527	6.49	4.98	88.53

Source: 1991 National Trade Data Bank

Figures 4.3, 4.4, and 4.5 show the share of each of the four U.S. Customs Districts for total bilateral trade, for northbound commercial motor vehicles, and for northbound commercial rail cars processed at the border (Ref 19).

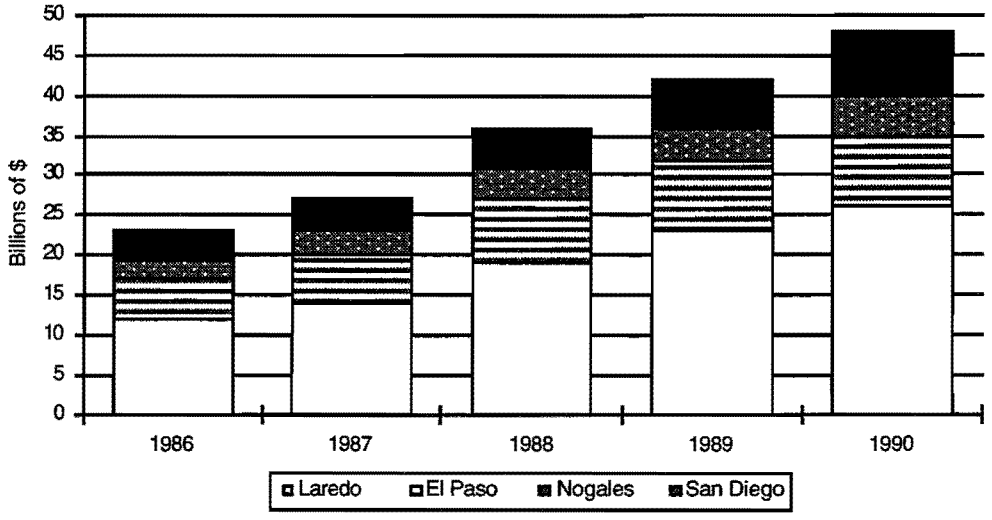


Figure 4.3 Total trade between the U.S. and Mexico through the border (Ref 19)

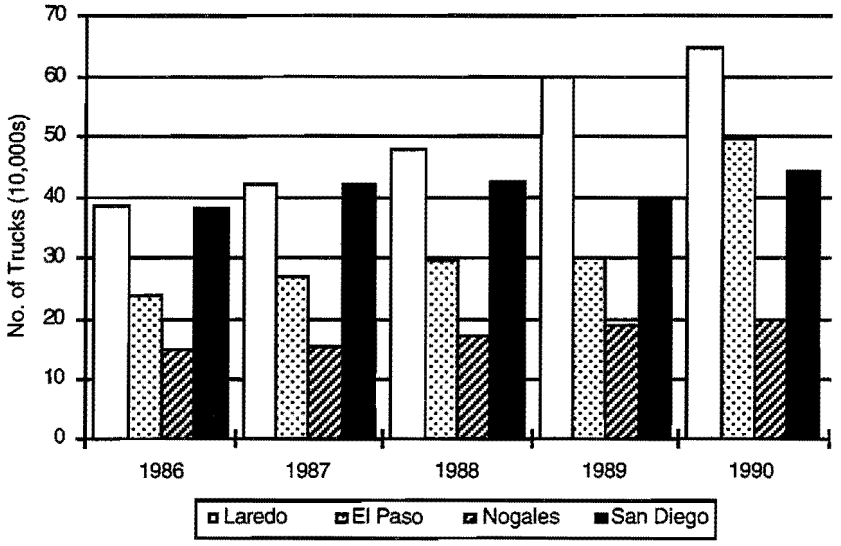


Figure 4.4 Northbound trucks processed at the U.S.-Mexico border (Ref 19)

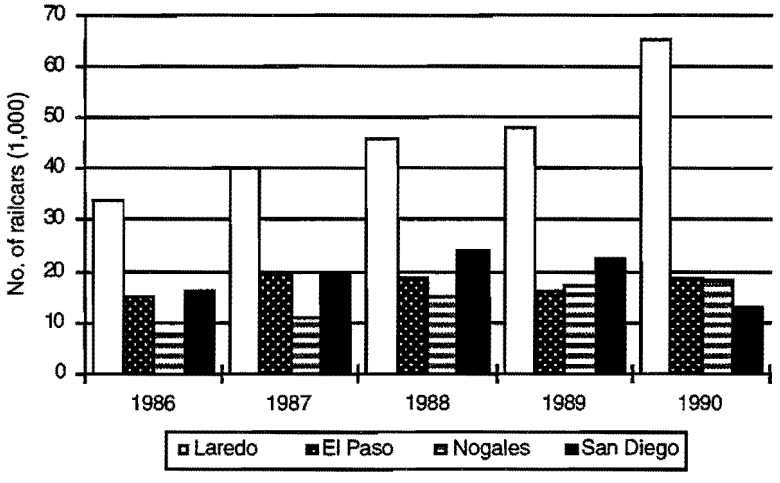


Figure 4.5 Northbound rail cars processed at the U.S.-Mexico border (Ref 19)

Within the Mexican highway network, there are three major corridors that run from north to south linking central Mexico with the major ports of entry at the U.S.-Mexico border (the Mexican railway network also follows this pattern). The major ports of entry at the U.S.-Mexico border for the Customs Districts are Laredo-Nuevo Laredo, El Paso-Cd. Juárez, Nogales-Nogales, and Otay Mesa-Mesa de Otay, as shown in Table 4.3.

Table 4.3 1990 total bilateral trade and largest ports of entry

U.S. Customs District	1990 Total Bilateral Trade (billions of dollars)	Largest Port of Entry
Laredo	25.5	Laredo-Nuevo Laredo
El Paso	9.1	El Paso-Cd. Juárez
San Diego	7.1	Otay Mesa-Mesa de Otay
Nogales	5.2	Nogales-Nogales

Source: U.S. General Accounting Office. U.S.-Mexico Trade: Survey of U.S. Border Infrastructure Needs. Washington, D.C., 1991.

4.2 TEXAS AND MEXICO BORDER REGION

The Texas-Mexico border is marked by the Rio Grande, which extends for more than 1,250 miles (2,012 km) from Brownsville in the east, to El Paso in the west. Offering a unique blend of Mexican and U.S. cultures, this region is one of the world's most dynamic trade and industry centers: Major industries include manufacturing, agriculture, civil service, refining, service industries, agribusiness, tourism, and retail and wholesale trade.

The 1990 census shows that Texas, at 16.9 million residents, is now among the ten fastest growing states in the U.S., showing a 19.4 percent growth rate from 1980 to 1990 (Ref 21). And as with any area, such rapid population increases can dramatically impact state employment. Figures of employment and unemployment at the main Texas metropolitan areas along the border are shown in Table 4.4.

Table 4.4 Employment and unemployment at Texas border metropolitan areas (Ref 39)

	Total nonagricultural employment (thousands)			Total employment (thousands)			Unemployment rate
Area	May 1992	May 1991	% Change	May 1992	May 1991	% Change	May 1992
Brownsville-Harlingen	80.8	77.0	4.9	100.3	94.9	5.7	12.2
El Paso	214.7	209.4	2.5	229.9	224.1	2.6	10.6
Laredo	49.1	47.3	3.8	51.9	49.8	4.2	9.1
McAllen-Edinburg-Mission	106.0	104.0	1.9	139.7	137.4	1.7	15.5
Total Texas	7,254.4	7,173.8	1.1	8,082.0	7,999.5	1.0	7.4
Total U.S.	108,830	108,640	0.2	117,535	116,624	0.8	7.2

On the other side of the border, the population in the four Mexican states (Tamaulipas, Nuevo Leon, Coahuila, and Chihuahua) is 9,762,530, based on the 1990 Population Census (Ref 22). Table 4.5 shows the work forces for each of these border states and for their main border cities.

Table 4.5 Population and work forces at the Mexican side of the border

State City	Total Population	Population of 12 or more years	Total Work Force	Unemployment Rate (%)
Tamaulipas	2,249,581	1,610,246	710,047	3.6
Matamoros	303,293	217,964	106,697	3.3
Nuevo Laredo	219,468	154,707	71,738	2.7
Reynosa	282,667	202,800	93,249	2.9
Nuevo Leon	3,098,736	2,256,645	1,036,770	2.6
Coahuila	1,972,340	1,397,353	605,251	3.2
Cd. Acuña	56,336	39,706	20,824	1.7
Piedras Negras	98,185	69,860	32,906	2.5
Chihuahua	2,441,873	1,724,403	797,051	3.0
Cd. Juárez	798,499	563,120	289,554	2.2

Source: INEGI. Resultados Definitivos XI Censo General de Población y Vivienda, 1990.

4.2.1 Ground Transportation

Ground transportation in Texas consists of both highway and railroad networks. The Texas highway system, according to 1991 figures, consists of more than 77,000 miles (123,970 km) of state-maintained roadway. Of this total, 3,200 miles (5,152 km) are interstate highways, 31,500 miles (50,715 km) are U.S. or state highways (see Fig. 4.6), and the remaining 41,400 miles (66,654 km) comprise the farm-to-market road system (Ref 23).

The Texas railroad system is grouped in three railroad classes. Seven Class 1 Railroads were operated over 11,000 miles (17,710 km) of track in Texas during 1988, as shown in Figure 4.7 (Ref 24). These railroad companies are Atchison, Topeka & Santa Fe (ATSF), Burlington Northern (BN), Kansas City Southern (KCS), Missouri-Kansas-Texas (MKT), Union Pacific (UP), Southern Pacific (SP), and St. Louis Southwestern (SSW). Class 2 and 3 railroads are operated over 796 track miles (1,281 km); among these, the Texas-Mexican Railway operates over 157 miles (253 km), linking Laredo with the Port of Corpus Christi.

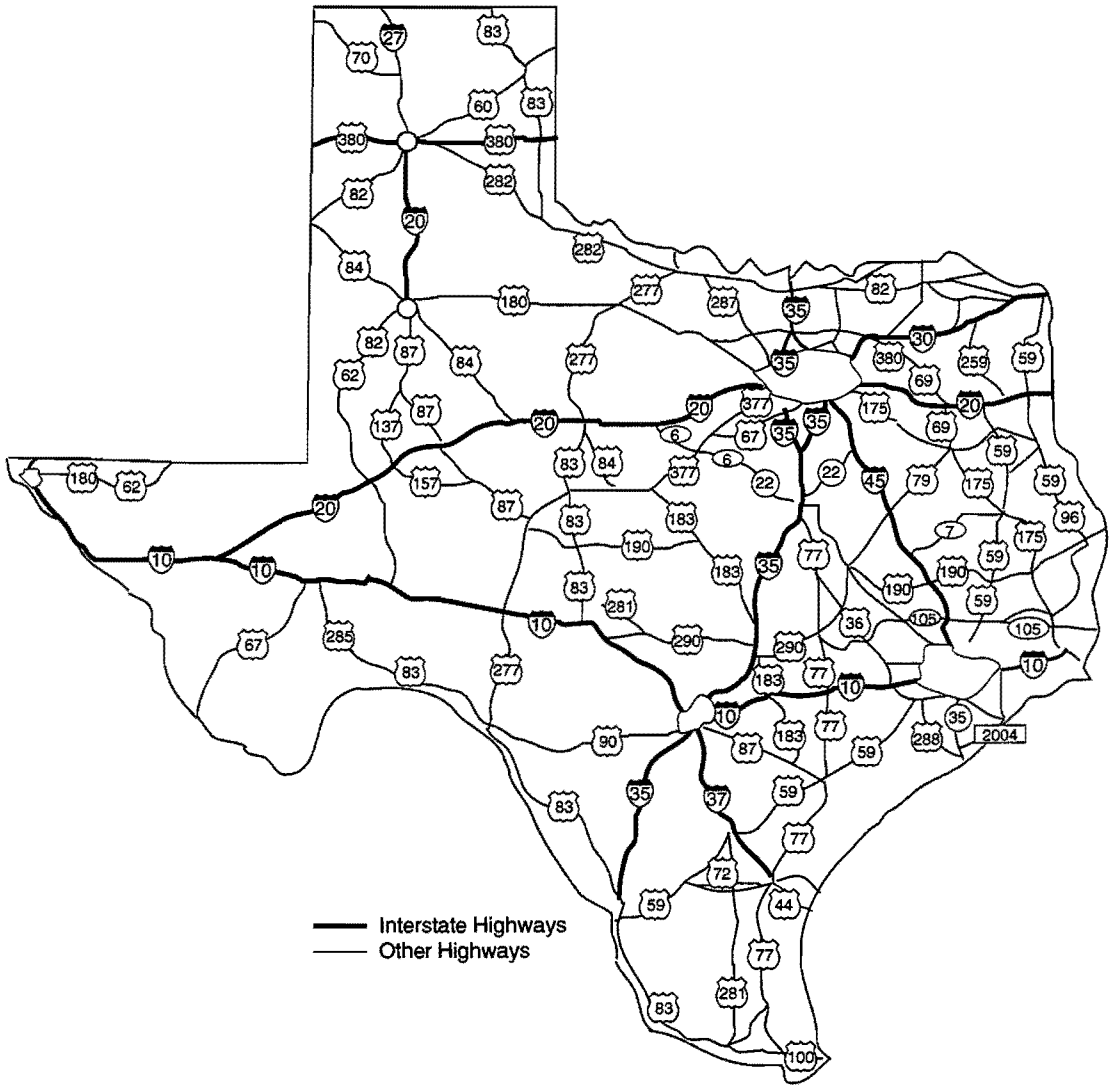


Figure 4.6 Texas highway trunk system

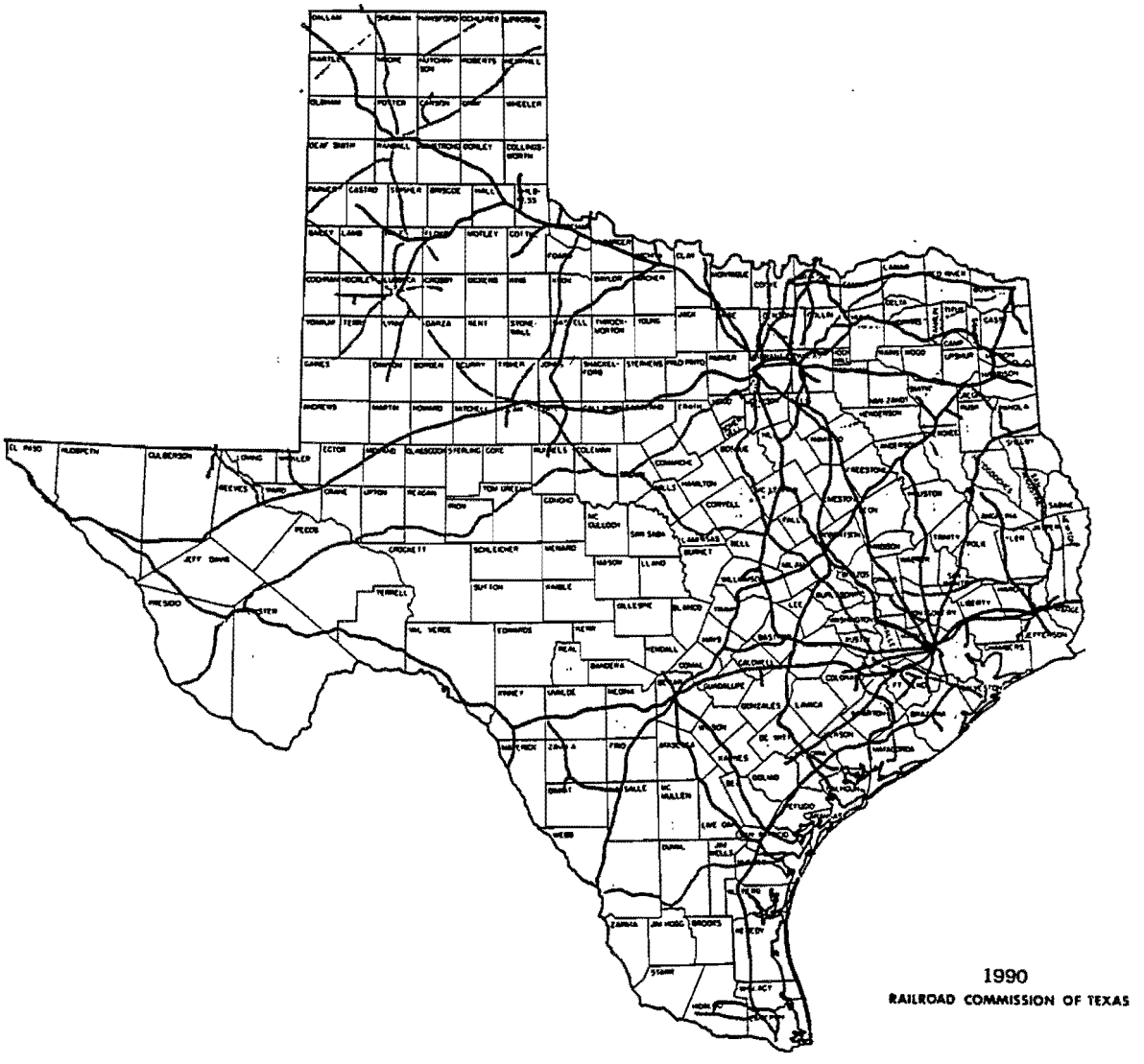


Figure 4.7 Major railroads operating in Texas

In Mexico, ground transportation similarly comprises both highway and railway networks. The Mexican highway system within the border states includes 4,853 miles (7,816 km) of trunk roads, 6,328 miles (10,191 km) of secondary roads, and 15,030 miles (24,204 km) of farm-to-market roads (Ref 27). Table 4.6 shows the distribution of the highway system among the Mexican border states.

The Mexican railroad system within the border states is comprised of 4,268 miles (6,873 km) of track: 582 miles (938 km) in Tamaulipas; 690 miles (1,111 km) in Nuevo Leon; 1,355 miles (2,183 km) in Coahuila; and 1,640 miles (2,642 km) in Chihuahua.

Table 4.6 Distribution of the Mexican highway system at the border states (km)

State	Trunk (km)*	Secondary (km)*	Farm-to-Market (km)*
Tamaulipas	2,183	2,998	7,479
Nuevo Leon	1,274	2,669	4,837
Coahuila	1,571	1,958	5,914
Chihuahua	2,788	2,566	5,974

*km=.62 mile
Source: Instituto Nacional de Estadística, Geografía e Informática, *Anuario Estadístico de los Estados Unidos Mexicanos 1988-1989*, Aguascalientes, Ags, 1990.

There are six primary twin cities along the Texas-Mexico border: Brownsville-Matamoros, McAllen-Reynosa, Laredo-Nuevo Laredo, Eagle Pass-Piedras Negras, Del Rio-Ciudad Acuña, and El Paso-Ciudad Juárez. Of these primary twin cities, the main ports of entry (a status conferred by their available transportation infrastructure) are Laredo-Nuevo Laredo, Brownsville-Matamoros, and El Paso-Cd. Juárez.

Mexico has three main north/south ground corridors that link its northern border with central Mexico. The west corridor passes through Nogales-Nogales, runs along the Pacific coast, and then proceeds to central Mexico. (There is a branch of this corridor at the northwest that links the border crossings between California and Baja California Norte.) The central and east corridors pass through the Texas-Mexico border, with the central corridor passing through El Paso-Cd. Juárez, and the east corridor running through Laredo-Nuevo Laredo. Both corridors are linked to central Mexico, with the east corridor having a branch that reaches Brownsville-Matamoros. Table 4.7 shows the import/export tonnage moved by rail at Texas-Mexico railway crossings.

The El Paso-Cd. Juárez port of entry is located along the central corridor. El Paso is served by three main highways in the U.S.—Interstate Highway 25 (north/south), Interstate 10 (east/west), and US 54. On the Mexican side, Cd. Juárez is served by a national highway, Mex-45 (north/south), that links this port of entry with inland states through Chihuahua and Torreón to central Mexico. This border crossing consists also of an international rail crossing served primarily by Southern Pacific (which maintains a modern intermodal terminal) and by the Atchison, Topeka & Santa Fe Railroad (which also carries significant tonnage through El Paso). In Mexico, as mentioned previously, rail service is provided by Ferrocarriles Nacionales de Mexico, a monopoly industry owned by the Mexican Government.

Table 4.7 Texas-Mexico railway crossings

	Southbound				Northbound			
	1988		1989		1988		1989	
Port of Entry	No. of Cars	Tons (1,000)*	No. of Cars	Tons (1,000)	No. of Cars	Tons (1,000)	No. of Cars	Tons (1,000)
El Paso-Cd. Juárez	7,639	492	8,074	501	7,182	480	8,683	573
Eagle Pass-Piedras Negras	13,921	938	17,383	988	7,406	357	8,619	409
Laredo-Nuevo Laredo	55,248	3,331	65,440	3,945	18,519	804	23,995	949
Brownsville-Matamoros	12,257	847	16765	1,157	3,352	231	3,276	213

*Ton=.907 Mg

Source: Instituto Mexicano del Transporte, *Manual Estadístico del Sector Transporte*, SCT, 1991.

The Laredo-Nuevo Laredo port of entry is located along the east corridor. Laredo, Texas, is served by two main highways in the U.S.—IH-35 (north/south) and US 59 (northeast). On the Mexican side, Nuevo Laredo, Tamaulipas, is served by the national highway Mex-85 that links this port of entry with central Mexico through Monterrey. At this port of entry, the rail crossing is dominated by Union Pacific (though it is also served by the Texas-Mexican Railroad).

4.2.2 Ocean Transportation

The most important Texas seaports that engage in U.S.-Mexico commerce include the Port of Brownsville, the Port of Corpus Christi, and the Port of Houston (see Figure 4.8).

The Port of Brownsville is a first-class deepwater port providing facilities for the movement of cargo to all parts of the world. Serving South Texas and Northern Mexico, the port is governed by the Brownsville Navigation District and is guided by a Board of Commissioners. Located at the southernmost tip of Texas, the port connects with the Gulf of Mexico via a 17-mile (27 km) channel. The city of Brownsville lies 2 miles (3.22 km) southwest, providing a gateway to Mexico across the Rio Grande. Cargo facilities include seventeen deep-sea docks (five of which are for petroleum and other bulk liquid products) and ten barge berths. The remaining docks are for dry cargo. Both rail and truck loading/unloading facilities adjoin all docks.

The principal imports and exports of the port are chemicals, petroleum, grain, cotton, agricultural products, sulfur, citrus, glass, steel, ores, fertilizers, and crude rubber. The port is also a major center of industrial development, with close to 200 companies doing business there. The Port of Brownsville handles all modes of transportation—ocean vessels, truck transport, rail service, air service from the Brownsville/South Padre International Airport, and barge service through the intercoastal waterway.

The Port of Corpus Christi, located midway between the East and West coasts, provides a vital link to leading agricultural and industrial regions of the U.S. and Northern Mexico. The port

is currently sixth largest in the U.S. in total tonnage, and third largest in import tonnage. In 1990, more than 71.4 million tons (64.7 million Mg) of cargo moved through the port.

Figure 4.8 Major seaports related to Texas-Mexico trade

The Port of Corpus Christi has twenty-six public docks at the main harbor that handle dry cargo, bulk materials, bulk oil, and grain, while thirty-one private docks service major petroleum refineries, petrochemical plants, and metal-fabrication operators. The Port is rail-served by the Texas-Mexican Railway company, the Southern Pacific Transportation Company, and the Union Pacific Railroad Company. There is an intermodal terminal located approximately 1 mile from Interstate Highway 37 that provides ready-access to both rail and highway transportation. The terminal features a truck scale and has the capability of mechanically mounting, dismounting, and

stacking containers and trailers to and from railroad cars. The Port of Corpus Christi's primary commerce with Mexico involves the importing of Mexican crude petroleum.

The Port of Houston, the third largest port in the U.S. in terms of total tonnage (126 million tons [114 million Mg] in 1991), is a general purpose, deepwater cargo port that leads the nation in handling wheat, iron, and steel products. The Turning Basin Terminal—a complex of wharves, transit sheds, warehouses, and a grain elevator—is responsible for handling bulk cargoes, steel, grain, and automobiles. The Port of Houston Authority owns 39 general cargo wharves available for public hire and two liquid cargo wharves. The Port Terminal Railroad Association provides service throughout the ship channel area, connecting the port to SP, ATSF, MKT, and BN railway companies.

The Mexican seaports involved in Texas-Mexico trade include the Port of Tampico, the Port of Altamira, and the Port of Veracruz. The total tonnage moved by each port in 1990 was 3.5, 0.6, and 4.3 million tons (3.1, 0.5, 3.9 million Mg), respectively (Ref 28). These Mexican ports have not handled significant amounts of traffic involving U.S.-Mexico trade because their infrastructure facilities have been inadequate and because rail service has been poor. In an effort to shore up trade, Mexico is now making an effort to upgrade its port system. In May of 1991, for example, the federal government dissolved the labor union at Veracruz and took control over the port operation; then, on July 18, 1991, the government changed Article 45 of the maritime commerce law, enabling the SCT to grant concessions to build and exploit docks and private facilities at the ports. Finally, in September 1992, the Salinas administration announced that it would consider selling Puertos Mexicanos, the government-run port facilities, as part of a plan to spur new investment and to make maritime shipping centers in Mexico more competitive with international ports.

4.3 SUMMARY

This chapter described the U.S.-Mexico border region and the importance of the various border crossings to transborder commercial traffic. The next chapter examines the regulatory barriers that have tended historically to inhibit trade in the U.S.-Mexico border region.

CHAPTER 5. MEXICO AND U.S. REGULATORY BARRIERS TO TRANSBORDER COMMERCIAL FLOW

There are many issues relating to U.S.-Mexico commercial truck traffic that must be resolved by specific provisions in NAFTA. This chapter examines some of the barriers that have inhibited this commercial transborder traffic.

5.1 RESTRICTION ON U.S. MOTOR CARRIERS' ACCESS TO MEXICO

While the Mexican constitution prohibits foreigners from operating commercial vehicles in Mexico, a decree issued in 1955 — the "Ruiz Cortines Decree"— permits U.S. motor carriers to operate within Mexico's border area. The problem is that the decree has not been uniformly applied across the border, and, consequently, U.S. commercial motor carriers are effectively denied access to most areas of Mexico.

Since 1987, the U.S. Department of Transportation, through negotiations with Mexico's Secretaria de Comunicaciones y Transportes, has sought to expand border access for motor carriers. However, pressure from truckers' unions has so far prevented the Mexican government from liberalizing laws regarding foreign access to Mexico.

Currently, the only Mexican border community granting reciprocity to U.S. motor carriers is Nuevo Laredo, which is located across the border from Laredo, Texas, and which is the major motor-carrier crossing-point in Texas. Under an informal agreement between U.S. and Mexican carriers in Laredo and Nuevo Laredo, each side's tractors (truck cabs) are permitted to deliver trailers across the border, though they must return without a load or with an empty trailer. Additionally, following the deregulation of its trucking industry in 1989, Mexico began to allow U.S. maquiladora plants in Mexico to use their own fleet of motor carriers to transport both their raw materials and final products across the border.

5.2 RESTRICTION ON MEXICAN MOTOR CARRIERS' ACCESS TO THE UNITED STATES

In response to Mexico's restrictions regarding U.S. commercial motor carriers, the United States has limited Mexican carriers to specified commercial zones. Under Section 226 of the 1984 Motor Carrier Safety Act, the U.S. requires that foreign commercial motor carriers operating in this country remain within designated commercial zones along the U.S.-Mexico border that have been defined by the Interstate Commerce Commission (ICC). The boundaries of the ICC commercial zones generally encompass the border port of entry and contiguous municipalities (or areas that are commercially a part of such a port of entry). Section 226 also requires that all foreign motor carriers obtain a certificate of registration from the ICC to operate within these commercial zones.

To obtain a certificate from the ICC, Mexican motor carriers must pay all applicable U.S. highway taxes to the Internal Revenue Service and must agree to comply with U.S. equipment safety standards regarding vehicle brakes, lighting, and electrical systems. Enforcement of the certificate requirement is the responsibility of the ICC and the U.S. Customs Service, with state

highway patrols primarily responsible for enforcing both the commercial zone restriction and the safety standards.

Currently, Mexican motor carriers do not meet U.S. safety requirements. Moreover, they tend to resist efforts made by U.S. authorities to enforce federal motor carrier safety requirements—efforts that in some cases have led to penalties being imposed on Mexican motor carriers at some ports of entry. At such times, Mexican Customs, local law enforcement agencies, and motor carriers' unions have reportedly retaliated by limiting the access of U.S. vehicles into Mexico at these ports of entry. These disruptions in commercial and passenger traffic have caused considerable hardship for communities on the U.S. side of the border. Consequently, local officials in these communities have pressured state and federal agencies to limit enforcement of the motor carrier safety regulations.

Finally, the Motor Commercial Vehicle Safety Act of 1986, under which Mexican commercial drivers are required to obtain commercial driver licenses that meet standards set by the U.S. Department of Transportation, further restricts Mexican motor carriers in the U.S.

5.3 U.S. AND MEXICO TRUCK SIZE AND WEIGHT REGULATIONS

Because of the increase in U.S.-Mexico trade, and as part of an attempt to identify the effects of the different regulations on the existing transportation infrastructure, policymakers on both sides of the border have focused on, among other things, truck size and weight regulations in both countries. These regulations, discussed below, are intended to balance the economic benefits of efficient freight transportation (in terms of trucking productivity) with the costs that large trucks can impose through road wear, accidents, geometric requirements for roads and bridges, and interference with the flow of other traffic.

5.3.1 U.S. Regulations

Highway maintenance has always been a state responsibility. And to ensure that roadwear did not become excessive, many states have, since 1913, set gross vehicle weight limits, load limits per inch of tire tread, and axle limits. In addition to the specific limits established by state and federal law, the states authorized special loads to be carried under permit.

In 1932, the American Association of State Highway Officials (AASHO) recommended a single-axle limit of 16,000 lb (7,264 kg) and a tandem-axle limit based on the distance between the two axles. In 1946, AASHO adjusted the limits to 18,000 (8,172 kg) for single axle and 32,000 (14,528 kg) for tandem axle, with a maximum weight limit of 73,280 lb (33,269 kg) recommended for vehicles with the axles extremes at least 57 ft (17.37 m) apart (to limit bridge over-stressing). The Federal Aid Highway Legislation of 1956 then applied the AASHO 1946 policy to Interstate systems. (A grandfather clause in the legislation permitted trucks having higher limits than were legal in some states before July 1, 1956, to operate on interstate highways.)

In 1974 Congress adopted recommendations made by the U.S. Secretary of Commerce in 1964. These recommendations included a 20,000 lb (9,080 kg) single axle, a 34,000 lb (15,436

kg) tandem axle—gross weights limited by the formula devised to protect bridges (known as Formula B)—and an 80,000 lb (36,320 kg) overall gross weight limit.

Throughout this evolution, each state adopted complex regulations on truck size and weight that unintentionally created problems for the trucking industry. In an effort to resolve the confusion, Congress, in the Surface Transportation Assistance Act of 1982, required all states to increase their single axle limits to 20,000 lb (9,080 kg), their tandem axle limits to 34,000 lb (15,436 kg), and their gross weight limit to 80,000 lb (36,320 kg); Congress also stated that it was up to the states to determine which permits qualify for grandfather exemptions under the 1956 act.

A 1981 Department of Transportation (DOT) study examining several types of changes in truck size and weight limits found that if truck weight limits were increased, transport cost savings from improved trucking productivity could overwhelm added costs for pavement and bridges. On the other hand, 1985 and 1986 DOT studies investigating the benefits and costs of a national network of Longer Combination Vehicles (LCVs) recommended against it.

In 1984 a new approach to truck size and weight regulation, proposed by Francis C. Turner (the Turner Proposal), called for lower axle weights but higher gross weights than trucks currently in use, a proposal intending to reduce pavement wear while increasing productivity. At AASHTO's request, the Transportation Research Board (TRB) analyzed the proposal and recommended limits that would modify the Turner prototype trucks (Ref 38). Today, if there were a broad consensus among responsible state agencies favoring the Turner proposal, it would be necessary for the states wishing to adopt the use of Turner trucks to seek from Congress a nationwide coordinated Turner truck policy providing for removal of federal regulatory barriers.

In summary, because each state has developed its own truck size and weight limits independently, a confusing array of size and weight regulations now exist (see Table 5.1).

5.3.2 Texas Regulations

Based on the 1989–1990 Texas Commercial Vehicle Laws issued by the Texas Department of Public Safety (Ref 36), the size of a vehicle shall not exceed 8.5 feet (2.6 m) in width and 13.5 feet (4.1 m) in height (including any load on the vehicle). For the length, no motor vehicle, other than a truck-tractor, shall exceed 45 feet (13.7 m). Any combination of three vehicle units to be coupled (including a truck and semi-trailer, truck and trailer, truck-tractor and semi-trailer and trailer, or a truck-tractor and two trailers) shall not exceed 65 feet (19.8 m). A semi-trailer may not exceed a length of 59 feet (17.98 m) when operated in a truck-tractor and semi-trailer combination. A semi-trailer or trailer may not exceed a length of 28 feet (8.8 m) when operated in a truck-tractor, semi-trailer, and trailer combination.

In terms of weight regulations, no vehicle shall weigh in excess of one or more of the following limitations:

- No vehicle shall exceed 20,000 pounds (9,080 kg) on any one axle, a tandem axle weight in excess of 34,000 pounds (15,436 kg), or an overall gross weight on a group of two or more consecutive axles produced by application of the following formula:

Table 5.1 Summary of state weight limits as of January 1988 (ATA 1988) (Note: 1 lb=.454 kg)

State	Axle Limits (lb)			Tire Width (lb/in.)	Gross Weight Law or Type of Restriction	Maximum Allowable Gross Weight (lb)	
	Single	Tandem	Triple			Interstate	Other Roads
Alabama	20,000	34,000	42,000	NS	Formula B	80,000	88,000
Alaska	20,000	34,000	42,000	550	Formula B	—	109,000
Arizona	20,000	34,000	42,000	NS	Formula B, Table A[a]	80,000	80,000
Arkansas	20,000	34,000	54,000	NS	Formula B[b], specific limits	80,000	80,000
California	20,000[c]	34,000	34,000	NS	Table B	80,000	80,000
Colorado	20,000	36,000	54,000	NS	Formula B, Table A[a]	80,000	85,000
Connecticut	22,400[d]	36,000[d]	53,800	600	Formula B, specific limits	80,000	80,000
Delaware	20,000	34,000	42,000	NS	Formula B, specific limits[e]	80,000	80,000
District of Columbia	20,000[f]	34,000[f]	42,000	NS	Table A	80,000	80,000
Florida	22,000	44,000	66,000	600	Table A and Formula B[g]	80,000	80,000
Georgia	20,340	34,000[h]	42,500	NS	Formula B	80,000	80,000
Hawaii	20,000	34,000	42,000	NS	Formula B, specific limits[e]	80,000	88,000
Idaho	20,000	34,000	42,000	600[i]	Table B	80,000	105,500
Illinois	20,000	34,000	42,000	NS	Table B, Table A[a]	80,000	73,280
Indiana	20,000	34,000	34,000	800	Formula B	80,000	80,000
Iowa	20,000	34,000	42,000	NS	Formula B	80,000	80,000
Kansas	20,000	34,000	42,000	NS	Formula B	80,000	85,500
Kentucky	20,000[d]	34,000[d]	50,000[d]	600	Specific limits	80,000	80,000
Louisiana	20,000[d]	34,000[d]	42,000	650	Specific limits	80,000	80,000
Maine	20,000	34,000	42,000	600	Formula B[e]	80,000	80,000
Maryland	20,000	34,000	42,000	—	Formula B	80,000	80,000
Massachusetts	22,400	36,000	54,000	800	Formula B	80,000	80,000
Michigan	20,000	34,000	39,000	700	Formula B	149,000[j]	154,000[j]
Minnesota	20,000	34,000	42,000[k]	600	Formula B, Table A[a]	80,000	73,280
Mississippi	20,000	34,000	42,000	550	Formula B	80,000	80,000
Missouri	20,000	34,000	34,000	NS	Formula B, Table A[a]	80,000	73,280
Montana	20,000	34,000	42,000	600[i]	Formula B	80,000	80,000
Nebraska	20,000	34,000	42,000[m]	NS	Table B	80,000	95,000
Nevada	20,000	34,000	42,000	NS	Formula B	80,000	109,000
New Hampshire	20,000[d]	34,000[k]	34,000	600	Formula B	80,000	80,000
New Jersey	22,400	34,000[d]	56,400	800	Formula B	80,000	80,000
New Mexico	21,600[c]	34,320	34,320	600	Table A	86,400	86,400
New York	20,000	34,000[d]	42,500[n]	800	Formula B[o], Table A	80,000	80,000
North Carolina	20,000	34,000	57,000	NS	Formula B	80,000	80,000
North Dakota	20,000	34,000	42,000	550	Formula B	80,000	105,500
Ohio	20,000	34,000	48,000	650	Table A	80,000	80,000
Oklahoma	20,000	34,000	42,000	NS	Table B	80,000	90,000
Oregon	20,000	34,000	42,000	600	Table B	80,000	80,000
Pennsylvania	20,000	34,000	42,500	800	Formula B[p]	80,000	80,000
Rhode Island	22,400	44,800	NS	NS	Specific limits	80,000	80,000
South Carolina	20,000[d]	35,200[d]	39,600[i]	600[i]	Table B[p], specific limits	80,000	80,600
South Dakota	20,000	34,000	42,000	600	Formula B	80,000	129,000
Tennessee	20,000	34,000	42,000	NS	Formula B	80,000	80,000
Texas	20,000	34,000	42,000	650	Table B	80,000	80,000
Utah	20,000	34,000	42,000	NS	Table B	80,000	80,000
Vermont	20,000	34,000	55,000	600	Table B	80,000	80,000
Virginia	20,000	34,000	42,000	650	Table B	80,000	80,000
Washington	20,000	34,000	42,000	600	Table B	80,000	80,000
West Virginia	20,000	34,000	42,500[n]	NS	Table B	80,000	80,000
Wisconsin	20,000	34,000	42,000	NS	Table B	80,000	80,000
Wyoming	20,000[c]	36,000	42,500	600[i]	Formula B, specific limits[e]	80,000	117,000

NOTE: NS = not specified.

[a] Table A applies off Interstates, primary highways, and certain other defined routes; check with state.

[b] Formula B applies over 73,280 lb gross weight.

[c] Steer axle limits: California, 12,500 lb; New Mexico, 10,000 to 12,000 lb; Wyoming, 12,000 to 14,000 lb.

[d] Higher limits allowed off Interstates (including tolerance where applicable).

[e] Specific limits apply off Interstates.

[f] Higher limits allowed on all highways except Interstates.

[g] Formula B applies over 73,271 lb gross weight.

[h] Higher weight limits apply for vehicles over 73,280 lb gross vehicle weight off Interstates.

[i] Vehicles manufactured before July 1, 1987, may carry 800 lb.

[j] Maximum allowable axle weight limited to 13,000 lb with one 32,000-lb tandem axle and an 18,000-lb steering axle.

[k] Requires 9 ft or more of spacing.

[l] Excludes steering axle from limit; Wyoming, 750-lb steering axle limit.

[m] Requires 8 ft or more of spacing.

[n] Requires 8 ft 6 in. or more of spacing.

[o] Formula B applies over 71,000 lb gross weight; under 71,000 lb, Table A.

[p] Table B applies over 75,195 lb gross weight on Interstates.

$$W = 500\left(\frac{LN}{N-1} + 12N + 36\right) \quad (5.1)$$

where W = overall gross weight on any group of two or more consecutive axles to the nearest 500 pounds, L = distance in feet between the extreme of any group of two or more consecutive axles, and N = number of axles in group under consideration (provided that such overall gross weight may not exceed 80,000 pounds or 36,320 kg).

- No vehicle shall have a greater weight than 600 pounds (272 kg) per inch-width of tire upon any wheel using high-pressure tires and 650 pounds (295 kg) using low-pressure tires, and no wheel shall carry a load in excess of 8,000 pounds (3,632 kg) on high-pressure tires and 10,000 pounds (4,540 kg) on low-pressure tires, nor any axle a load in excess of 16,000 pounds (7,264 kg) on high-pressure tires, and 20,000 pounds (9,080 kg) on low-pressure tires.

5.3.3 Mexico Regulations

In Mexico, the Federal Government is responsible for establishing the vehicle size and weight regulations through the Dirección General de Autotransporte Federal (DGAF) under the Secretaría de Comunicaciones y Transportes (SCT). In 1977, the SCT asked the DGAF to conduct an analysis of vehicle size and weight regulations (Ref 33) in cooperation with the public, private, educational, and research organizations involved in this matter. The analysis and evaluation of the regulations resulted in recommendations to modify the law, which were revised and approved by SCT officials. By 1980 the president of Mexico changed the corresponding vehicle size and weight regulations contained in the "Capítulo XI del Reglamento del Capítulo de Explotación de Caminos de la Ley de Vías Generales de Comunicación" (Ref 32), which remain in force to this day.

The new regulations increased the maximum allowable length from 18.3 meters (60 feet) to 22 meters (72.2 feet), allowing full trailers (truck-tractor and two trailers) to operate on designated highways (Refs 2 and 3). Gross vehicle weight was increased from 34 tons (75,000 pounds or 34,050 kg) to 77.5 tons (171,000 pounds or 77,634 kg). Axle limits were increased as follows:

- single axle with single tires from 5 tons (11,000 pounds or 4,994 kg) to 5.5 tons (12,125 pounds or 5,505 kg)
- single axle with dual tires from 9 tons (19,850 pounds or 9,012 kg) to 10 tons (22,050 pounds or 10,011 kg)
- tandem axle from 14.5 tons (32,000 pounds or 14,528 kg) to 18 tons (40,000 pounds or 18,160 kg)
- triple axle of 22.5 tons (49,600 pounds or 22,518 kg) was introduced in the regulations

The new law defined vehicle and road classifications for regulation purposes. The heavy vehicle classification, based on type and axle number, is shown in Figure 5.1, while the road classification, based on the type of vehicles allowed to operate, is as follows:

- type A — all the classified vehicles are allowed to operate
- type B — all buses and vehicles type C2, C3, T2-S1, T2-S2, and T3-S2 are allowed to operate
- type C — all buses and vehicles type C2 and C3 are allowed to operate

Table 5.2 shows the current truck axle weight limits, while Table 5.3 shows the size and gross vehicle weight limits. The new domestic size and weight regulations being determined by SCT have not yet been released for general discussion. Accordingly, they could not be evaluated or reported in this study.

Table 5.2 Mexico truck axle weight limits

		ROAD TYPE					
		A		B		C	
AXLE	TIRES/AXLE	kg	lb	kg	lb	kg	lb
Single	2	5,500	12,125	5,000	11,023	4,000	8,818
Single	4	10,000	22,046	9,000	19,841	8,000	17,637
Dual	2	9,000	19,841	7,500	16,535	7,000	15,432
Dual	4	18,000	39,683	15,000	33,069	14,000	30,864
Triple	4	22,500	49,604	NA	NA	NA	NA

Note: Road Type: A - Roads that allow all truck traffic specified in the regulations
B - Roads that allow only C2, C3, T2-S1, T2-S2, and T3-S2 truck traffic
C - Roads that allow only C2 and C3 truck traffic

Source: SCT, Capitulo XI del Reglamento del Capitulo de Explotacion de Caminos de la Ley de Via, Generales de Comunicacion que trata del Peso y otras Caracteristicas de los Vehiculos, 1980.

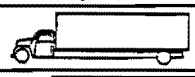
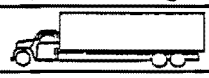
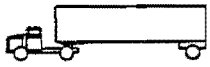
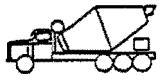
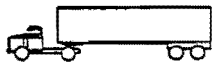
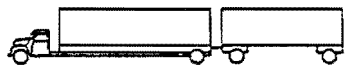
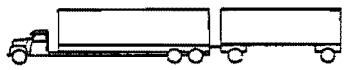
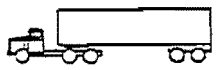
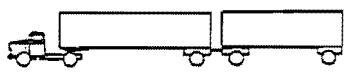
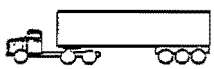
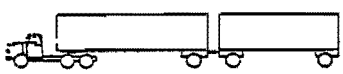
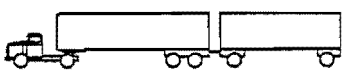
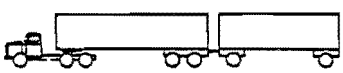
Code	Axles	Description	Sketch
C2	2	Truck	
C3	3	Truck	
T2-S1	3	Tractor and Semitrailer	
C4	4	Truck	
T2-S2	4	Tractor and Semitrailer	
C2-R2	4	Truck and Trailer	
C3-R2	5	Truck and Trailer	
T3-S2	5	Tractor and Semitrailer	
T2-S1-R2	5	Tractor, Semitrailer, and Trailer	
T3-S3	6	Tractor and Semitrailer	
T3-S1-R2	6	Tractor, Semitrailer, and Trailer	
T2-S2-R2	6	Tractor, Semitrailer, and Trailer	
C3-R3	6	Truck and Trailer	
T3-S2--R2	7	Tractor, Semitrailer, and Trailer	
T3-S2-R3	8	Tractor, Semitrailer, and Trailer	
T3-S2-R4	9	Tractor, Semitrailer, and Trailer	

Figure 5.1 Mexico's truck classification (Ref 5)

Table 5.3 Mexico size and gross vehicle weight limits

				ROAD TYPE					
	OVERALL			A		B		C	
TRUCK	HEIGHT	WIDTH	LENGTH	kg	lb	kg	lb	kg	lb
C2				15,500	34,171	14,000	30,864	12,000	26,455
C3			12.2 m	23,500	51,808	20,000	44,092	18,000	39,683
C4			(40.03 ft)	28,000	61,729	NA	NA	NA	NA
T2-S1				25,500	56,217	23,000	50,706		
T2-S2				33,500	73,854	29,000	63,933		
T2-S3			17.0 m	38,000	83,775	NA	NA		
T3-S2	4.15 m	2.50 m	(55.77 ft)	41,500	91,491	35,000	77,161		
T3-S3	(13.62 ft)	(8.20 ft)		46,000	101,412				
C2-R2				35,500	78,263				
C3-R2			19.0 m	43,500	95,900				
C3-R3			(62.34 ft)	51,500	113,537				
T2-S1-R2				45,500	100,309				
T2-S2-R2				61,500	135,583				
T3-S1-R2			22.0 m	53,500	117,946				
T3-S2-R2			(72.18 ft)	61,500	135,583				
T3-S2-R3				69,500	153,220				
T3-S2-R4				77,500	170,857				

Note: NA - Not Allowed
Road: A - Roads that allow all truck-type traffic specified in the regulations
B - Roads that allow only C2, C3, T2-S1, T2-S2, and T3-S2 truck traffic
C - Roads that allow only C2 and C3 truck traffic
Source: SCT, Capitulo XI del Reglamento del Capitulo de Explotacion de Caminos de la Ley de Vias Generales de Comunicacion que trata del Peso y otras Caracteristicas de los Vehiculos, 1980.

5.3.4 Comparison

As illustrated in Table 5.4, U.S. and Mexico truck size regulations differ only slightly. U.S. trucks, though practically the same height, are 4 percent wider and 10 percent shorter than Mexican trucks.

Table 5.4 U.S.-Mexico truck size regulations

Dimension	U.S. feet	Mexico feet	U.S. meters	Mexico meters	Difference %
Width	8.50	8.20	2.60	2.50	+4
Height	13.5	13.62	4.11	4.15	-1
Max. Length	65	72.18	19.81	22.00	-10

In terms of truck axle weight limits, Mexican regulations allow a maximum of 18 percent more axle weight than U.S. regulations, as shown in Table 5.5.

Table 5.5 U.S.-Mexico truck axle weight limits

Type of axle	U.S.* lb***	Mexico** lb	Difference %
Single axle	20,000	12,125	
Single axle w/dual tires	20,000	22,050	10
Tandem axle	34,000	40,000	17
Tridem axle	42,000	50,000	18

* Federal Regulations
** Regulations for road type A
***lb=.454 kg

While the differences between U.S and Mexico truck-size-and-weight regulations are minimal, there are great differences in the application and uniformity of the regulations. For example, Mexican regulations are set by the federal government and are uniform throughout the different Mexican states; by contrast, U.S. regulations are set at the state level, with no uniformity of specific regulations among the states. Important also is the fact that Mexican regulations are not always enforced.

5.4 SUMMARY

This chapter examined the regulatory barriers that hinder transborder commercial flow. It is expected that specific NAFTA provisions will eliminate some of these problems.

The following chapter focuses on the Laredo-Nuevo Laredo metropolitan areas, analyzing in particular local economic activity, existing and proposed transportation infrastructure, and local transborder commercial operations.

CHAPTER 6. LAREDO-NUEVO LAREDO AREA

Because it serves as a major gateway to both the U.S. and to Mexico, the Laredo, Texas, and Nuevo Laredo, Tamaulipas, area is widely recognized as the most important port of entry along the U.S.-Mexico border. This chapter describes the area, its international traffic, and U.S.-Mexican efforts to improve the transportation infrastructure there.

6.1 AREA DESCRIPTION

Laredo's population, according to the 1990 U.S. census, is 122,899. Across the border, Nuevo Laredo has 219,468 residents. The total labor force in Laredo, as of May 1992, is 51,900, with an unemployment rate of 9.1 percent (Ref 39); Nuevo Laredo boasts a workforce of 71,700, with 2.7 percent unemployment (Ref 40).

In Nuevo Laredo, the number of maquiladora plants increased from 26 in 1986 to over 80 in 1991, an increase of 208 percent. An additional 90 maquiladora plants have been established in the state of Nuevo Leon and in other states just south of Nuevo Laredo. Presently, Laredo-Nuevo Laredo accommodates 170 maquiladora plants, which account for 20,000 jobs in Nuevo Laredo and 10,900 jobs (directly and indirectly) in Laredo (Ref 41).

Thirty-four motor freight carriers provide interstate and intrastate services in the Laredo area. In addition, the city is serviced by licensed carriers that provide international service to Nuevo Laredo, and by a considerable number of specialized and exempt motor carriers authorized to transport bulk commodities, heavy equipment, perishable products, and exempt agricultural products (Ref 42).

Some of the major trucking companies that serve Laredo include ABF Freight Systems, Brown Express, Central Freight Lines, Celadon Trucking, El Paso Freight Systems, Gateway Transfer, MS Carriers, Southern Trucking, and Yellow Freight. The community is further served by approximately 60 major Mexican motor carriers in Nuevo Laredo that provide direct line service to all parts of Mexico. Table 6.1 shows the approximate highway mileage from Laredo-Nuevo Laredo to major cities in the U.S. and in Mexico.

6.2 EXISTING TRANSPORTATION INFRASTRUCTURE

The twin cities of Laredo and Nuevo Laredo lie on a key corridor linking the U.S. industrial heartland with the key population centers in Mexico. The principal highway and railroad leading from Saltillo and Monterrey, in the industrial heartland of Mexico, converge on Laredo-Nuevo Laredo to meet two major rail lines, Interstate 35, and other roads that fan outwards to the urban centers and seaports of Texas.

Laredo, Texas, is served by the following highways: (1) Interstate 35 to the north (the only four-lane, divided highway); (2) U.S. 59, which runs northeast to Houston and intersects State Highway 44 to Corpus Christi; (3) Highway 359 to the east; (4) U.S. 83, which runs southeast from Laredo along the border and northwest from IH-35; and (5) FM 1472 (Mines Road) to the

west (30 miles [48.3 km] along this stretch intersecting FM 255 is the International Solidarity Bridge; see Figure 6.1).

Table 6.1 Highway mileage from Laredo to major cities in the U.S. and in Mexico

City	Distance from Laredo	
	Miles	Kilometers
San Antonio	154	248
Houston	301	484
Dallas	424	682
Corpus Christi	150	241
Detroit	1,546	2,489
New York	1,946	3,133
Chicago	1,341	2,159
Atlanta	1,137	1,830
Denver	1,115	1,795
Minneapolis	1,490	2,399
Kansas City	978	1,574
St. Louis	1,054	1,697
Monterrey	143	230
Mexico, D.F.	740	1,191
Leon	593	956
Guadalajara	620	998
Torreón	370	596

6.2.1 Existing Ground Transportation Infrastructure at Laredo

Laredo is served by two major railroad companies: the Texas-Mexico Railroad, which connects to the deepwater Port of Corpus Christi, and the Union Pacific Railroad, which provides freight services to all of the U.S. and Canada. In response to increasing U.S.-Mexico trade, the Union Pacific Railroad has undertaken the construction of a new intermodal container facility 12 miles (19.3 km) north of the city. The first phase of this $12.5-million switching yard has now been completed on 180 acres (71 hectares), with the second phase of the project to begin soon on an additional 200 acres (79 hectares).

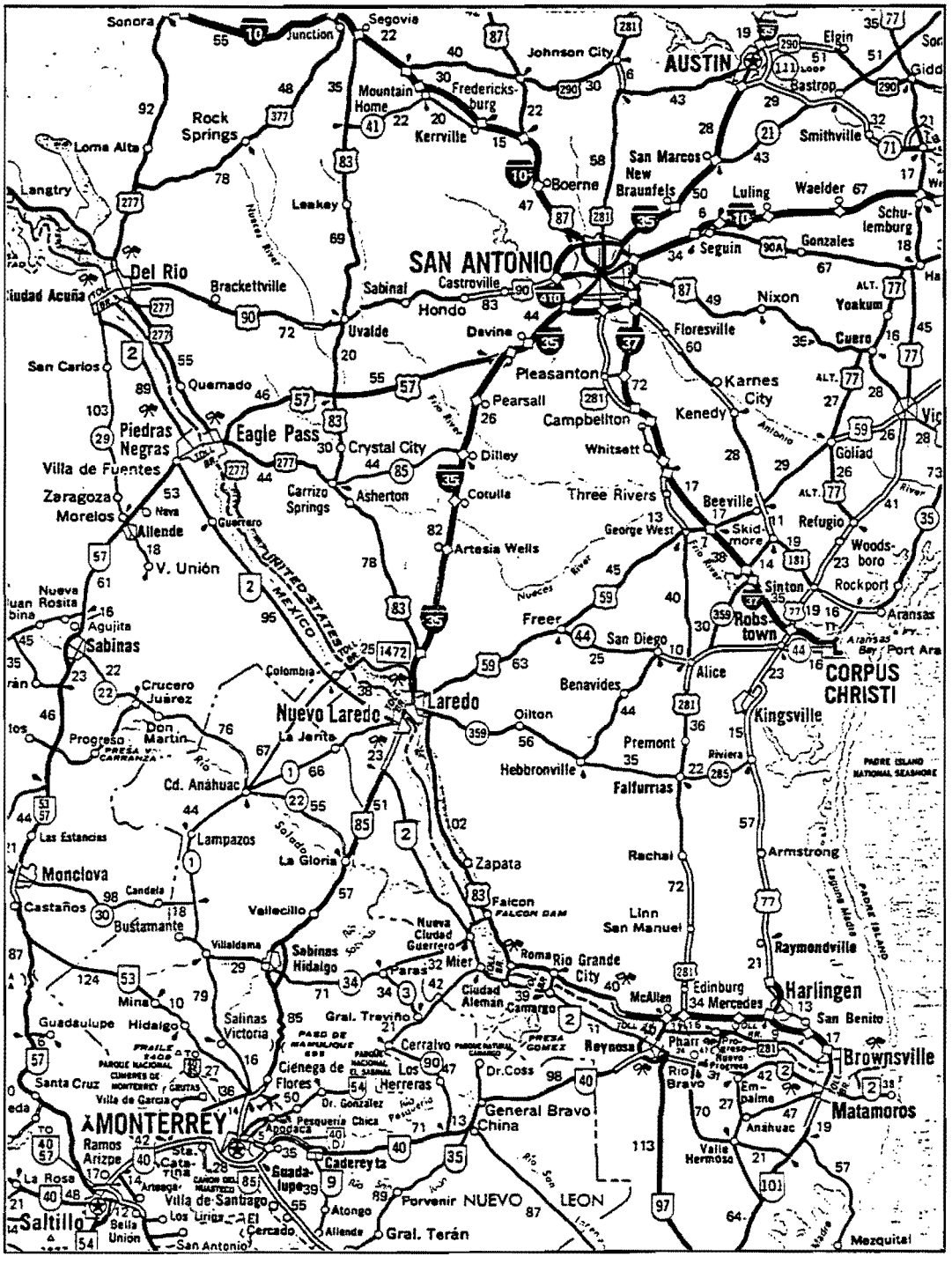


Figure 6.1 Existing highway infrastructure in Laredo-Nuevo Laredo area

6.2.2 Existing Ground Transportation Infrastructure at Nuevo Laredo

Nuevo Laredo is served by the following two-lane highways: (1) Mex 85, which connects with Monterrey to the south; (2) Mex 2, which runs along the border connecting Nuevo Laredo with Reynosa to the southeast and with Piedras Negras to the northwest (28.6 miles [46 km] along this last stretch is the new international Solidarity Bridge at Colombia); and (3) Mex 1, which links Nuevo Laredo and Monterrey and which runs parallel to the railroad (see Figure 6.1).

Ferrocarriles Nacionales de Mexico (FNM), the government-owned railroad company, provides single-track service from Nuevo Laredo to central Mexico (passing through Monterrey and Saltillo).

6.2.3 Existing International Bridges (Ref 43)

There are three international bridges and one railroad bridge within the Laredo-Nuevo Laredo area. The railroad bridge and two of the three bridges, known as Bridge I (Convent Street) and Bridge II (Juárez/Lincoln), are located within the core area (see Fig. 6.2); the other bridge, dubbed the Laredo-Colombia Solidarity Bridge, is located approximately 30 miles (48 km) to the northwest.

The railroad bridge crossing the Rio Grande, a single-track bridge of unknown age, is owned by the Texas Mexican Railway Company. The border station facility on the U.S. side consists of a single-story building that belongs to the railway company and which houses the U.S. Customs office. On the Mexican side, there is a small office belonging to FNM that accommodates Mexican customs.

Bridge I (Convent Street), a toll facility, is the oldest of the four bridges. It has three northbound and three southbound lanes for vehicle crossings and two sidewalks for pedestrian crossings. Because it is closer to downtown shopping areas, Bridge I is the most popular pedestrian crossing in Laredo.

Bridge II (Juárez/Lincoln) is also a toll facility. The seven-lane bridge (two northbound, two southbound, and one reversible) was opened to traffic in 1976. Pedestrians are not allowed on this bridge (Mexico does not have appropriate pedestrian facilities on their side).

The Laredo-Colombia Solidarity Bridge, first opened to traffic in August 1991, is also a toll facility. The bridge has eight lanes for vehicle traffic and two for pedestrians.

The bridges are jointly owned and operated by the City of Laredo through the Laredo Bridge System (LBS) and by the Mexican government through the Caminos y Puentes Federales de Ingresos y Servicios Conexos (CPFISC). All the bridges are toll facilities, with the toll scheme differing for northbound and southbound traffic. The toll in the northbound direction, collected by CPFISC before vehicles cross the bridge, is based on vehicle classification. For commercial vehicles, the toll is based on the number of axles and does not differentiate between loaded and empty trucks (see Table 6.2).

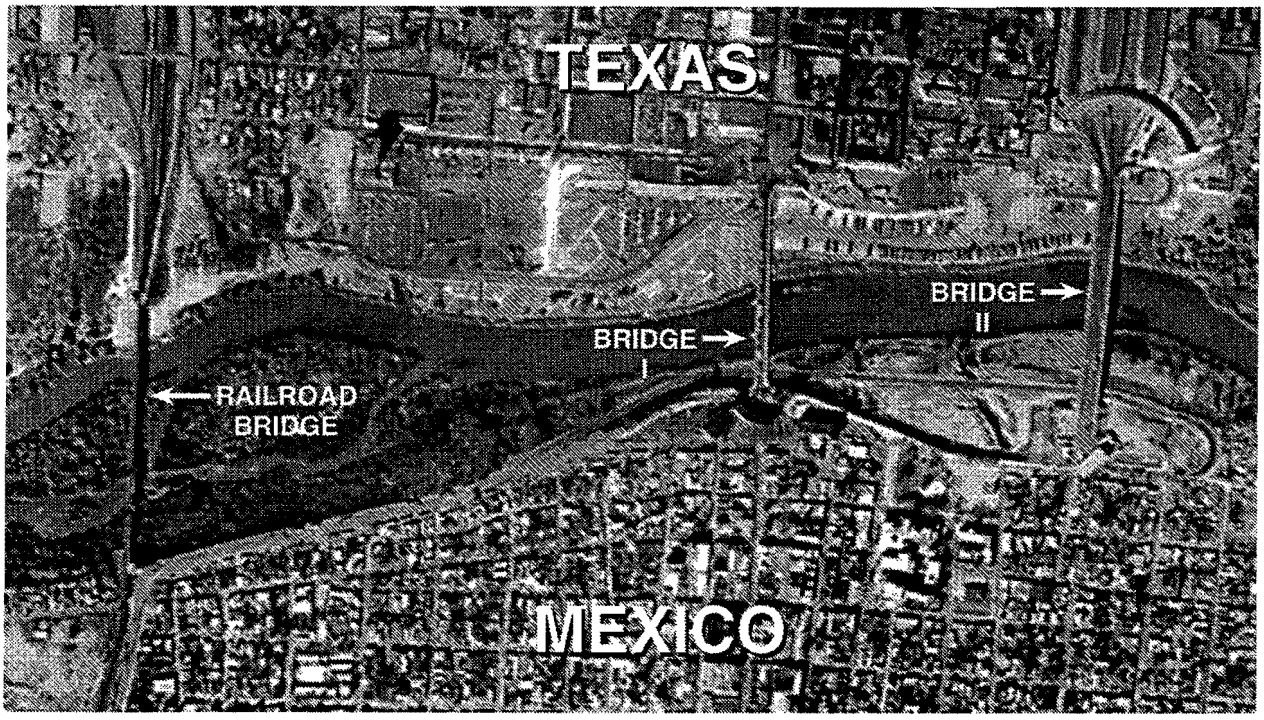


Figure 6.2 International bridges in the Laredo-Nuevo Laredo area

Table 6.2 Northbound toll scheme for Laredo bridges

Vehicle	Toll (Pesos)	Toll* (U.S. Dollars)
Autos and Pickups	6,000	1.90
Buses and Two-Axle Trucks	18,000	5.70
Three-Axle Trucks	30,000	9.50
Four-Axle Trucks	42,000	13.30
Five-Axle Trucks	54,000	17.1
Six-Axle Trucks	66,000	20.9
Additional Axle	12,000	3.80

Note: *3,156 pesos per U.S. Dollar
Source: Caminos y Puentes Federales de Ingresos y Servicios Conexos.

The toll in the southbound direction is also collected by the LBS before vehicles cross the bridge. The toll scheme is based on vehicle classification: For commercial vehicles, the toll is based on the number of axles and does differentiate between loaded and empty trucks (see Table 6.3); for loaded trucks, the toll is paid using freight coupons bought in advance by the trucking companies. Trucks weighing over 84,000 pounds (38,136 kg) must be approved prior to crossing

the bridge by the City of Laredo Engineering Department. Both Bridge I and the Laredo-Colombia Bridge use scales to enforce weight limits.

Table 6.3 Southbound toll scheme for Laredo bridges

Vehicle	Empty	Loaded
Autos	$1.00	
Half-ton (907 Mg) Pickups	1.00	2.00
Autos and Half-ton Pickups Pulling Small Trailers	2.00	3.00
Pickups with Rear Twin Wheels	1.00	4.00
Two-Axle Bobtail Truck	1.00	4.00
Three-Axle Bobtail (Torton)	1.50	6.00
Tractor Trailer under 84M lb (38M kg)	5.00*	12.00
Tractor Trailer at 84M-100M lb (38M–45M kg)		24.00
Tractor Trailer over 100M lb (45M kg)		30.00

Note: *Other three-axle (or more) empty trucks
Source: Laredo Bridge System

The tolls collected southbound go to the City of Laredo and are used to fund city projects. In 1991, approximately 16 percent of bridge revenues were set aside for street reconstruction. The tolls collected northbound go to the federal government in Mexico.

6.3 INTERNATIONAL COMMERCE THROUGH LAREDO-NUEVO LAREDO

A recent study (Ref 44) of major U.S. ground transportation corridors showed that Laredo is the dominant port in U.S. export trade with Mexico. According to the study, the major ground transportation corridor for U.S. exports to Mexico originates in the northeastern U.S. Beginning in New York City, exports flow down from New Jersey to Pennsylvania (Pittsburgh), where they are joined by exports from the mid-Atlantic. The export flow continues to St. Louis and then to Oklahoma City, where exports from the industrial north central region are incorporated. Exports then travel south along the Interstate 35 corridor, which the study determined was the most heavily traveled corridor.

The results also show that Laredo (see Table 6.4) is the only port that has dominant dollar value and transportation linkages with all regions of the U.S. (the study used dollar-value-miles, or dollar value of exports—DVM—multiplied by distance traveled as a surrogate for transportation costs to determine dominant transportation linkages between regions in the U.S. and southern border ports; see Figure 6.3); additionally, Laredo's linkages are considered critical to corridors originating in the New York-New Jersey area and in the industrial north central region.

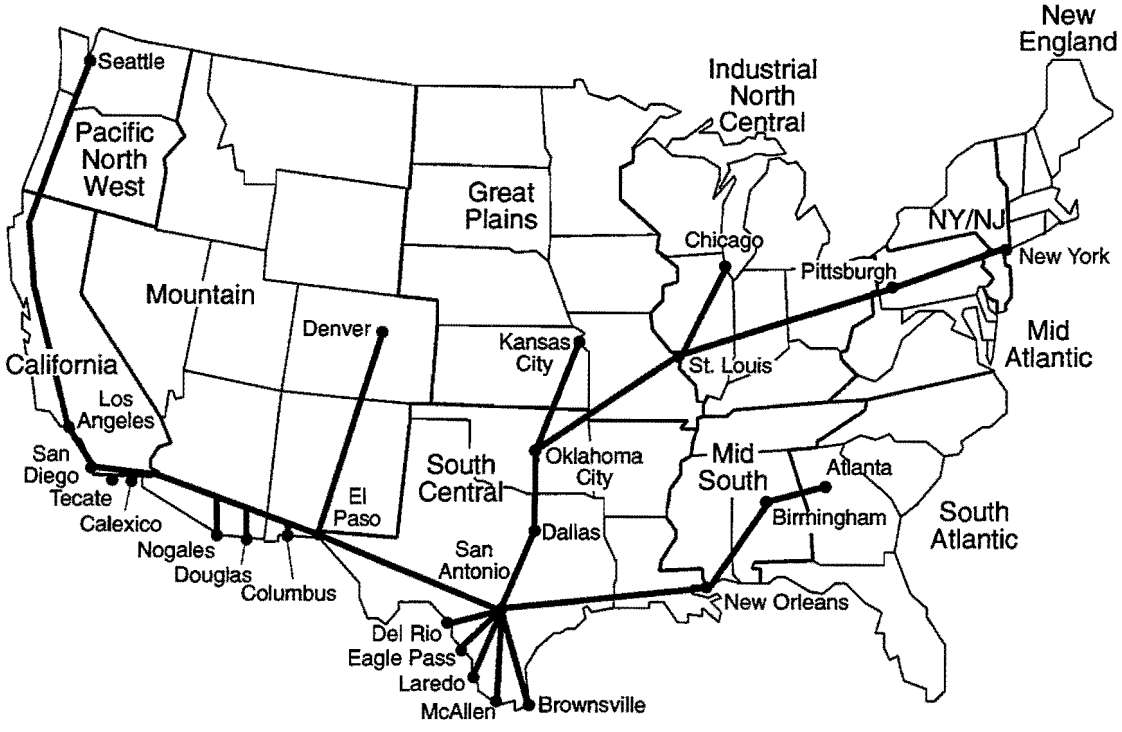


Figure 6.3 U.S. export regions, major cities, ground export corridors, and ports of export

A study of the port-of-entry problems at Nuevo Laredo (Ref 45) shows that Nuevo Laredo is the most important port of entry along the U.S.-Mexico border (in terms of bilateral trade). It also shows that this port handles much of Mexico's trade with Canada, Europe, and the Far East (see Table 6.5), a reflection of the exporter's preference for the lower cost and higher efficiency of U.S. transportation services. (Thus, in a typical Europe-to-Mexico routing plan, the European exporter would bypass the obvious port of entry—the Port of Veracruz—in favor of southern U.S. ports, using a combination of these ports with north-south ground transportation. The lack of appropriate infrastructure at the Port of Veracruz, which was discussed in previous chapters, is presently being addressed by the Mexican Government.)

The study also shows that in 1990 Mexico imported 6,141,953 tons (5.5 million Mg) and exported 1,998,864 tons (1.8 million Mg) through Nuevo Laredo, approximately 3 times more imports than exports in terms of tonnage, and 2.5 times more imports than exports in terms of value.

Table 6.4 1989 U.S. exports to Mexico transported by ground through Laredo

Region	Dollar Value	Miles / km	DVM
Pacific NW	97,580,361	2,520 / 4,057	245,902,509,720
California	314,738,103	1,560 / 2,511	490,991,440,680
Subtotal	412,318,464		736,893,950,400
Mountain	105,554,533	1,423 / 2,291	150,204,100,459
Great Plains	459,118,409	973 / 1,566	446,722,211,957
S. Central—Dal	1,429,371,121	422 / 679	603,194,612,893
Subtotal	1,888,489,530		1,049,916,824,850
New England	238,133,877	2,096 / 3,374	499,128,606,192
NY NJ	729,155,865	2,096 / 3,374	1,528,310,693,040
Mid Atlantic	355,584,947	1,708 / 2,750	607,339,089,476
Ind. N. Central	2,511,590,927	1,410 / 2,270	3,541,343,207,070
Subtotal	3,834,465,616		6,176,121,595,778
S. Atlantic	401,290,401	1,129 / 1,817	453,056,862,729
Mid South	246,534,176	984 / 1,584	242,589,629,184
S. Central—Hou	952,914,080	346 / 557	329,708,271,818
Subtotal	1,600,738,657		1,025,354,763,731
Port Totals	7,841,566,800		9,138,491,235,219

Source: McCray, Groff, and Reeves (Ref 6)

Table 6.5 1990 Mexico trade through Nuevo Laredo (thousands of dollars) (Ref 45)

Country/Region	Exports	Imports	Total
U.S.	$2,823,747 93.06 %	$6,030,302 90.46 %	$8,854,049 91.27 %
Canada	$53,732 1.77 %	$165,639 2.48 %	$219,371 2.26 %
Asia	$34,208 1.13 %	$148,218 2.22 %	$182,426 1.88 %
E.E.C	$38,198 1.26 %	$133,110 2.00 %	$171,308 1.77 %
Rest of the World	$84,599	$189,187	$273,786
	2.79 %	2.84 %	2.61 %
Total Nuevo Laredo	$3,034,484	$6,666,456	$9,700,940
Total Mexico	$26,779,323	$31,245,352	$58,024,675

Note: Percentage based on Nuevo Laredo total

6.4 EXISTING CUSTOMS FACILITIES CHARACTERISTICS (REF 46)

The border-station facility at Bridge I on the U.S. side consists of two buildings with four primary vehicle inspection points and twenty-two secondary inspection spaces for northbound non-commercial vehicle traffic. On the Mexican side, the border facility consists of two buildings, with three primary vehicle inspection points for southbound non-commercial vehicles and four for commercial truck traffic. Commercial trucks that require inspection are diverted to the import lot located at Bridge II.

Bridge II border inspection facilities on the U.S. side consist of five buildings, twelve primary vehicle inspection points, and fifty-four secondary inspection spaces for northbound non-commercial vehicles; also included are an import lot having a 10-ft (3-m) dock that can accommodate 14 trucks (no vehicle off-loading is performed) and a 22-ft (6.7-m) dock that can accommodate 43 trucks (the 10-ft dock will be demolished when the new dock is expanded). On the Mexican side, the border facility consists of one building, three primary vehicle inspection points for southbound non-commercial vehicles, and two vehicle inspection points for commercial truck traffic heading for the import lot (which has a dock that can accommodate 32 trucks and a parking lot that can accommodate more than 40 trucks).

At the Laredo-Colombia Solidarity Bridge, the U.S. border station facility consists of two initial buildings, two primary vehicle inspection points (expandable to twelve), six secondary inspection spaces (expandable to thirty-six), and an import lot that, for the first phase, has a 50-ft (15.2-m) wide dock that can accommodate 50 trucks (phase II will provide for 50 trucks more, and phase III will provide for an additional 100 trucks if required).

6.5 TRANSBORDER COMMERCIAL OPERATIONS

Freight moving through the border from one point in Mexico to an intermediate or final destination in the U.S. (or vice versa) can generate congestion and delays on both sides of the border. This section briefly discusses the problems associated with transborder commercial operations.

6.5.1 Motor Carriers

The issue of equal access for commercial motor carriers in both countries has broadly defined present transborder operations. Currently, the only Mexican community along the border permitting U.S. motor-carrier access is the city of Nuevo Laredo. Under an informal agreement negotiated between U.S. and Mexican carriers in Laredo and Nuevo Laredo, each side's tractors are permitted to deliver trailers across the border, though they must return without a load or with an empty trailer. Truck drivers, normally Mexican drivers, simply pick up trailers at truck yards in the U.S. and deliver them to sites or loading facilities in Mexico (and vice versa). This operation, repeated several times a day, is provided by local drayage companies.

The northbound truck traffic approaches the bridges from the west using the main truck route at Nuevo Laredo. All loaded trucks go under Bridge I to reach Bridge II, which handles loaded trucks (Bridge II represents the only entrance to the U.S. Customs import lot at this time;

tractors and empty trucks can use any bridge and any access street, since they are not required to enter the import lot).

While southbound truck traffic, empty or loaded, can use both bridges, loaded trucks having in-bond merchandise must use Bridge I, where the export lot is located (in-bond merchandise is foreign merchandise that is shipped through the U.S. whose final destination is another country and for which no duties would be made on the goods, since it is not formally inspected by U.S. Customs). Truck traffic using Bridge I approaches that bridge using the truck routes coming from the west (where the railroad and warehouses are located). On the Mexican side, just after crossing the bridge, loaded trucks must make a right turn to enter the inspection points. After clearing customs, the truck is free at this point, but if the truck requires further inspection it is diverted to the Mexican customs import lot located between the two bridges (empty trucks are not required to enter the inspection points). Drivers access Bridge II directly from IH-35, using exactly the same process as required for Bridge I (loaded and empty trucks). All southbound loaded trucks using the bridges after clearing Mexican customs must use the same truck route followed by northbound loaded trucks accessing the bridges.

The following describes the process involved in moving freight by motor carrier in each direction. For northbound commercial operations, the process starts when a Mexican shipper or carrier needs to move cargo to the U.S. from some point of origin in Mexico. The shipper or carrier requests that a Mexican broker (agente aduanal) at the border point of entry handle the transborder operation. The Mexican broker, who can provide warehouse and holding yard services for the cargo, ensures clearance through Mexican customs and hires a transfer service; the broker must also coordinate the operation with the U.S. broker to ensure clearance at U.S. Customs. In order to clear Mexican customs, the Mexican broker has to verify that the cargo matches export documents (pedimentos), to make sure that documents are in order and complete, and to pay duties in advance. Once all the paperwork has been completed and Mexican customs cleared, the cargo (along with manifestation documents and an exit authorization form) is taken by the transfer service. The exit authorization form is handed in at the exit gate located at the access to Bridge II in front of the toll facility. Then the cargo proceeds to the U.S. Customs import lot, where the U.S. broker is expecting the cargo; the U.S. broker matches the manifestation documents sent to him by the Mexican broker with the documents brought with the cargo to be submitted to the import inspector. The import inspector inputs the information into a computerized system that, based on the history of the client, determines whether the cargo should be inspected (though the inspector always has the power to override the computer's recommendation). Once the cargo clears customs, the documents are handed to the broker along with an authorization for the cargo to leave the import lot; the U.S. broker then has 10 days to pay custom's duties. From the import lot, the transfer service proceeds to take the cargo to a warehouse, holding yard, or intermodal yard (depending upon client request), where the cargo is transported to its final destination by a U.S. carrier.

The southbound commercial operation is similar, though with minor differences. The southbound commercial operation begins when a U.S. shipper or carrier brings the cargo to the

port of entry from its point of origin in the U.S. The shipper or carrier contacts a freight forwarder or, less frequently, a U.S. Customs Broker Agency (Ref 47), who conducts the transborder operation. Usually, they will receive notification prior to the shipment, giving them time to prepare U.S. and Mexican customs' paperwork. U.S. Customs requires a Shipper's Export Declaration for all cargo that leaves the country. Mexican customs requires that duties be paid in advance before the cargo crosses the border. The U.S. forwarder works jointly with a Mexican broker in this process. Once the U.S. forwarder receives notification that the paperwork is completed, the cargo crosses the border using either Bridge I or Bridge II, where the Mexican broker meets the cargo at the primary commercial vehicles inspection booths and matches manifestation documents and presents them to Mexican customs. At this point, Mexican customs determines whether the cargo should be inspected by a computerized random system which has a built-in percentage probability assigned (depending on the type of cargo being processed). If the system indicates inspection, the cargo must be taken to the Mexican import lot located between the two bridges. After Mexican customs releases the cargo, it goes to a warehouse or holding yard (depending on client request); the cargo is then taken to its final destination in Mexico by a Mexican carrier.

6.5.2 Rail Carriers

Transborder commercial operations that make use of rail are slightly different from motor carrier operations in two respects: there is no transfer operation and no trains cross the border. For northbound cargo, Ferrocarriles Nacionales (FNM) arranges the rail cars by railway company (Texas-Mexico and Union Pacific) in its switching yard; then a FNM locomotive pushes the rail cars to the middle of the railroad bridge, where Texas-Mexico hooks up the rail cars and delivers them to their respective railroad company. When the rail cars cross the bridge, the rail carrier notifies U.S. Customs, which determines whether to inspect the cargo or to let the cargo proceed.

For southbound cargo, Texas-Mexico first arranges the rail cars by Mexican destination, and then pushes them to the middle of the bridge, where a FNM locomotive pulls the rail cars to Mexican Customs facilities, and Mexican customs then randomly selects the rail cars to be inspected and moved to their inspection facilities. After inspection, FNM moves the rail cars into Mexican territory.

Clearing customs on both sides of the border is also done by customs brokers who are responsible for the pre-clearing (despacho previo) operation.

6.6 ON-GOING AND PROPOSED TRANSPORTATION INFRASTRUCTURE IMPROVEMENTS

On both sides of the border, transportation officials are working to improve transportation infrastructure. State and local authorities from Texas, Tamaulipas, Nuevo León, and the Federal Government of Mexico are working together — using both public and private funds — to improve regional and local transportation infrastructure. The more relevant projects are described below.

6.6.1 Laredo, Texas

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) states that:

> It is the policy of the United States to develop a National Intermodal Transportation System that is economically efficient and environmentally sound, provides the foundation for the nation to compete in the global economy, and will move people and goods in an energy efficient manner.

To accomplish this objective, ISTEA requires a statewide transportation planning process that coordinates the various metropolitan transportation plans in the state. Accordingly, the Metropolitan Planning Organization (MPO) designated for the Laredo metropolitan area is required to prepare, and to update periodically, a long-range plan (20-year forecast). The planning process must consider all modes of transportation and must be on-going, cooperative, and comprehensive. At the same time, the MPO is required to develop a Transportation Improvement Program (TIP) in cooperation with the state and with affected transit operators. The TIP must include a priority list of project segments (consistent with metropolitan long-range planning) to be carried out within a 3-year period after the initial adoption of the TIP and to be updated at least every 2 years.

The city of Laredo, in coordination with the MPO and the Texas Department of Transportation (TxDOT), developed a long-range thoroughfare plan that includes projects funded by Laredo itself, Capital Improvement Projects (CIP), and state and federally funded projects that fall under the ISTEA umbrella (TIP); these are shown in Figure 6.4. Already 90 percent complete is the widening of Mines Road (FM 1472 from IH-35 to FM 255), which provides a connection to the Laredo-Colombia Bridge. Presently, the city is working on the right-of-way acquisition (almost 80 percent has been acquired) to upgrade the road to a four-lane divided highway; TxDOT has contracted the first section of this project.

For short-term projects, TxDOT has for its Project Development Plan a first phase that, in accordance with the MPO, includes improvements to the national highway system. Among these improvements is the expansion of the urban section of IH-35 from four to six lanes, with further plans to modify ramp configurations to increase efficiency. Future improvements will involve the Inner and Outer Loop, a network of bridges connecting all major interstate and state highway systems in the area. The Inner Loop project has been given a higher priority, principally because it will divert traffic from Laredo's downtown area and will thus reduce congestion. Other related projects: the construction of Bridge III to tie into the Inner Loop; the development of the section of the Texas Highway Trunk System that links Laredo to Corpus Christi; and the merging of the Outer Loop with a planned fourth bridge.

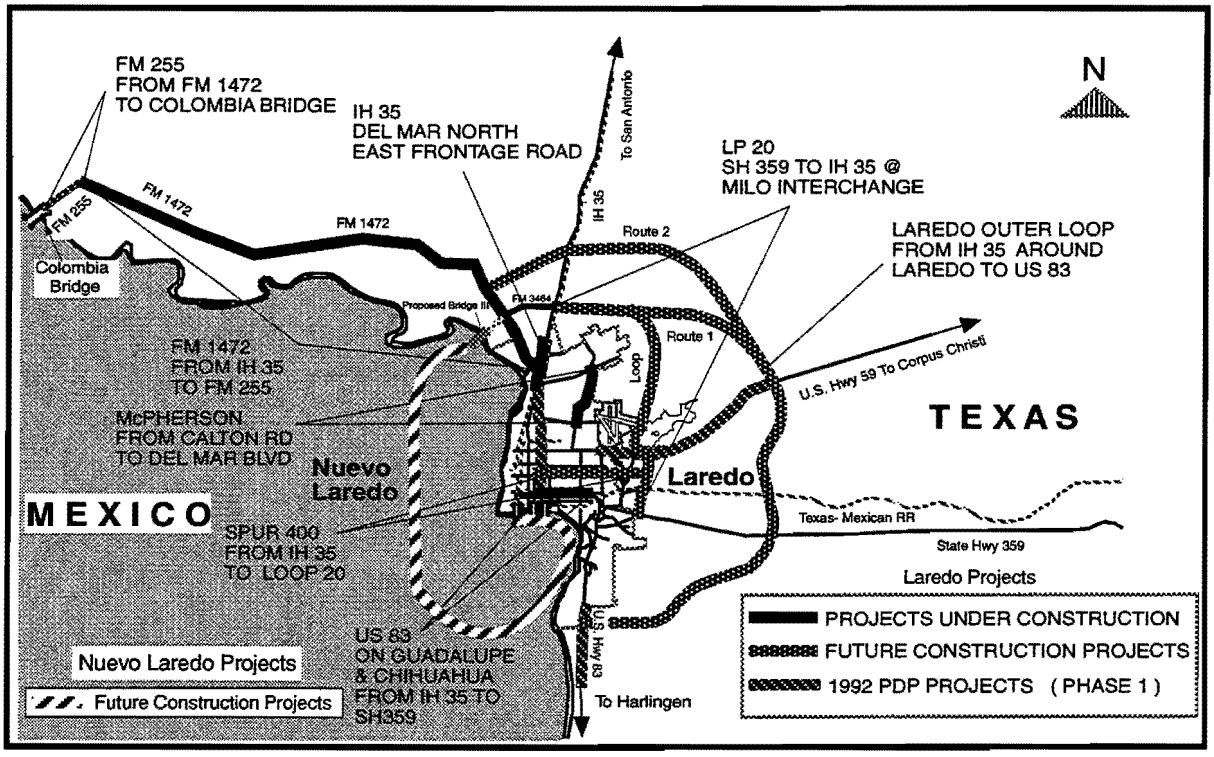


Figure 6.4 Major road projects at Laredo, Texas, and Nuevo Laredo, Tamaulipas

The proposal to construct a 22-mile (35.4 km) limited-access private toll road between the Laredo-Colombia Solidarity Bridge and U.S. 83 and IH-35 has been pursued by Camino Colombia, Inc., a Texas private toll road corporation comprised of Laredo landowners and businessmen. The plan calls for the project to be privately funded, with no local, state, or federal money or right-of-way dedicated to the corporation by its shareholders. The proposal argues that the road will allow commercial traffic to access a direct, high-speed corridor between Monterrey, Laredo, Corpus Christi, Houston, San Antonio, Austin, Dallas, and points beyond.

6.6.2 Nuevo Laredo, Tamaulipas

In 1989, Mexico implemented an aggressive program aimed at expanding Mexico's national road network. Two specific projects in the Nuevo Laredo area underscore this new commitment: The 106-mile (171-km) Monterrey-Nuevo Laredo Toll Road, which is nearing completion, and the 63-mile (102-km) stretch that links this highway, at La Gloria, with the Laredo-Colombia Bridge (presently underway).

The city of Nuevo Laredo itself has short-term, mid-term, and long-term projects to improve its transportation infrastructure (see Fig. 6.4). The short-term project presently underway seeks to upgrade the congested streets accessing Bridge II.

There are two mid-term projects that Nuevo Laredo is conducting. The first is known as the "Boulevard Rivereño" or "Boulevard Oriente," which is located east of the city at the intersection of Mex 85 and the road to the Nuevo Laredo International Airport; it runs east to the Rio Grande, and then goes upstream parallel to the river to Bridge II. (The city has already acquired the right-of-way necessary for the project.) The second mid-term project is the "Boulevard Poniente," located west of the city. This project involves the lengthening of the airport road going north up to the Rio Grande to the proposed Bridge III. This project, still very much in the planning stage, depends on the development of Bridge III.

These mid-term projects are being coordinated with officials in Laredo, Texas, to benefit the Laredo-Nuevo Laredo community and to achieve an effective solution to the problems of commercial and non-commercial border traffic.

Finally, a major project that will mitigate many traffic congestion problems within Nuevo Laredo and that will improve the integration and quality of life for the community involves moving the FNM switching yard from the western downtown area to a location coordinated with the proposed Bridge III. This project has mobilized many U.S and Mexican entities, including the City of Nuevo Laredo, the State of Tamaulipas, FNM, the City of Laredo, Union Pacific Railroad Company, and other interested parties committed to integrating this project with the transportation improvement projects taking place on both sides of the border.

6.7 SUMMARY

This chapter analyzed Laredo-Nuevo Laredo economic activities, the existing and proposed transportation infrastructure, and, finally, local transborder commercial operations. The next chapter focuses on traffic conditions and problems within the area.

CHAPTER 7. LAREDO-NUEVO LAREDO COMMERCIAL TRAFFIC

This chapter presents two elements of Laredo-Nuevo Laredo commercial traffic—flow conditions and problems. It also analyzes vehicle traffic on major highways, traffic at international bridges, and truck traffic within the area.

7.1 EXISTING VEHICLE TRAFFIC FLOW CONDITIONS

This section describes three aspects of vehicle traffic flow in the area: (1) vehicle traffic volume on major highways in the Laredo-Nuevo Laredo area; (2) traffic crossing the international bridges; and (3) truck traffic within the cities.

7.1.1 Vehicle Traffic on Major Highways

Using highway traffic flow data, researchers can determine the level of service at which a stretch of road is operating; they can also monitor traffic trends and growth so as to design future road improvements. Vehicle traffic on major Texas highways, monitored regularly by the Texas Department of Transportation, is presented as either annual average daily traffic (AADT) or average daily traffic (ADT) (Ref 48). Additionally, some information about traffic composition is provided (e.g., percentage of trucks). In Mexico, the Secretaria de Comunicaciones y Transportes (SCT) is responsible for collecting traffic data on the highway network. The SCT issues a yearly publication providing AADT for the whole network and traffic composition for some of the major highways (Ref 49).

Figure 7.1 shows 1989 AADT on the major highways in the Laredo-Nuevo Laredo area. Traffic volumes for 1989 were used to show the same base year figures for both sides of the border, since these volumes were the most current information available for Mexican highways. Traffic along the major Laredo highways was characterized by sections using 1992 ADT and truck percentage (see Table 7.1). The ADT in both directions was registered along the highways on the mile post listed in the table. For each highway, the mile posts were listed, starting with the downtown area. Given that highway traffic represents total traffic in Table 7.1, we found that traffic distribution on the specified highways (outside the core area) to be the following: IH-35 was 36 percent, SH 359 was 18 percent, US 59 and US 83 were 17 percent, and FM 1472 was 11 percent. Truck traffic distribution on these highways was as follows: IH-35 was 48 percent, US 59 was 26 percent, SH 359 was 11 percent, US 83 was 9 percent, and FM 1472 was 6 percent.

Historic traffic volumes obtained from permanent recording stations provide a very good indicator of traffic growth. The Texas Department of Transportation has two permanent Automatic Traffic Recorders (ATR) within the Laredo area (Ref 50). One is located on IH-35, 0.7 miles (1.12 m) north of FM 1472, and the other on SH 359, 4.9 miles (7.89 km) east of US 83. Figure 7.2 shows the increase in traffic at these two locations.

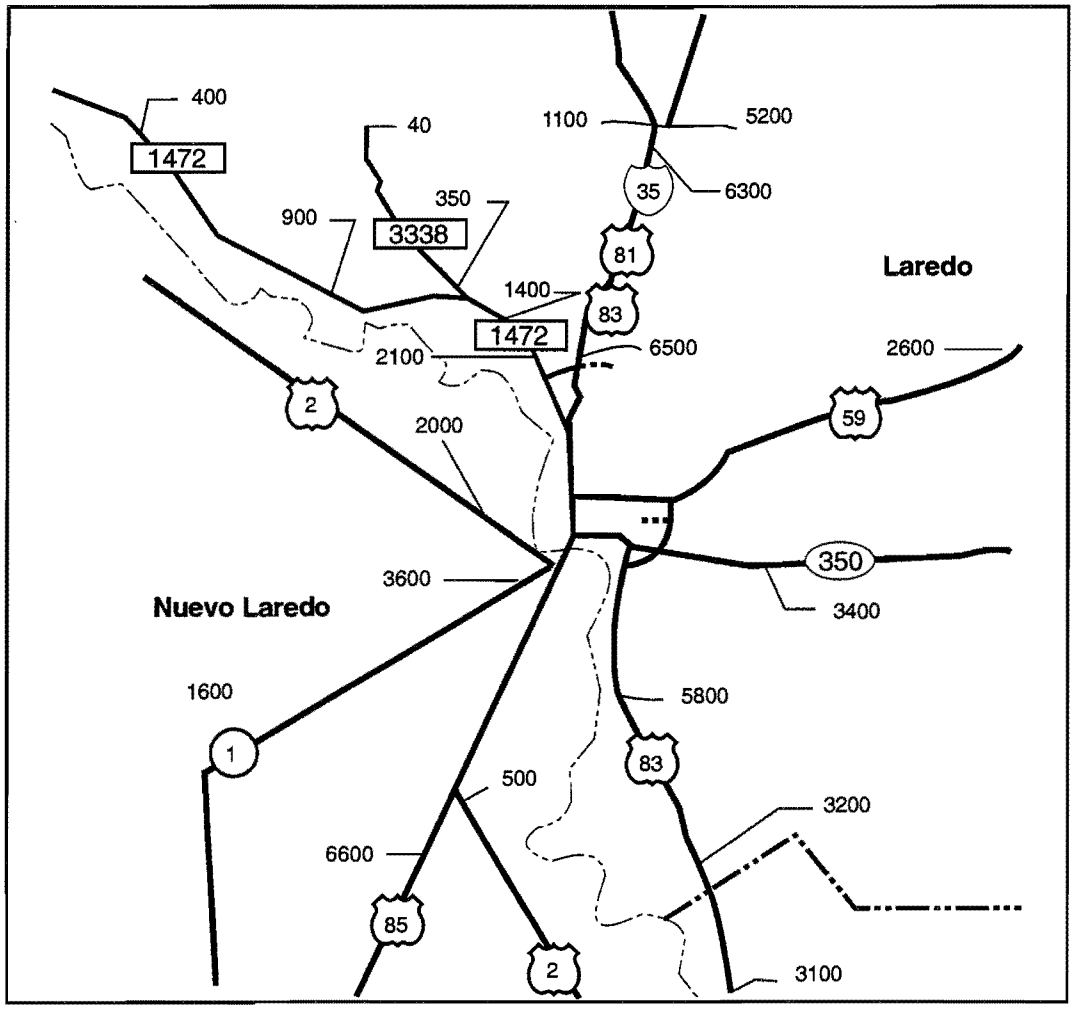


Figure 7.1 1989 AADT on major highways at Laredo-Nuevo Laredo (Ref 48)

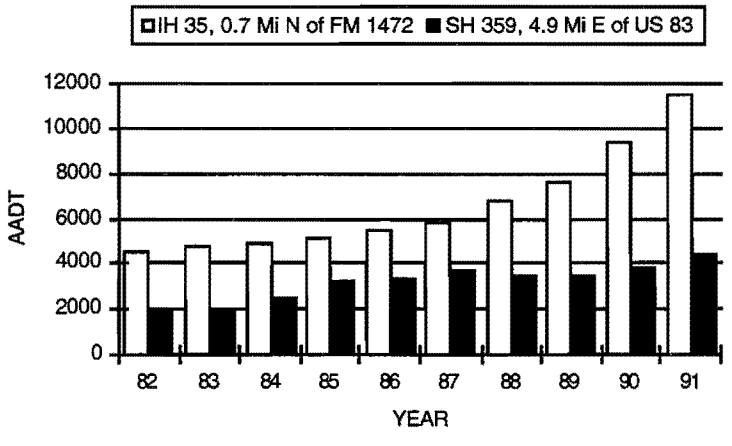


Figure 7.2 AADT trend at two highway locations at Laredo (Note: 1 mile=1.61 km)

Table 7.1 1992 ADT and percentage of trucks on major Laredo highways

Highway	MP-B	MP-E	ADT	% Trucks	Highway	MP-B	MP-E	ADT	% Trucks
IH-35	0.000	2.500	36,050	16.4	US 83 (south)	1.000	2.000	19,900	5.3
	2.500	4.000	33,720	8.6		2.000	6.500	10,000	6.7
	4.000	5.000	29,370	9.3		6.500	8.250	6,200	8.5
	5.000	5.500	24,000	17.5		8.250	11.000	4,200	10.7
	5.500	7.500	10,550	21.5		11.000	17.000	2,800	10.4
	7.500	14.000	8,890	22.9	SH 359	2.250	2.750	8,100	7.6
	14.000	19.000	7,040	25.2		2.750	4.000	4,800	9.5
	19.000	28.000	5,930	27.2		4.000	5.250	6,500	8.3
	28.000	38.000	5,740	27.6		5.250	7.000	4,400	9.9
US 59	47.500	46.000	30,000	19.5		7.000	16.000	4,100	10.3
	46.000	44.750	11,700	21.5		16.000	21.500	3,000	12.6
	44.750	41.500	3,700	28.9		21.500	27.000	1,450	12.6
	41.500	28.000	3,000	31.4	FM 1472	17.000	17.500	18,400	7.5
	28.000	0.000	2,700	32.9		16.000	17.000	5,700	8.2
						11.250	16.000	2,500	9.6
						0.000	11.250	1,900	10.3

Note: MP-B=Mile Post Begins
MP-E=Mile Post Ends
Source: Texas Department of Transportation

The difference in traffic growth for these two highways could be explained by the fact that they play different roles in the transportation system. For example, IH-35 is a major north-south corridor of national and international importance, while SH 359 is of local or state importance. The IH-35 traffic showed an average annual growth rate of 13.3 percent from 1986–1991, a figure that reflects changes in Mexico's economic and foreign trade policies. On the other hand, SH 359 traffic showed an average annual growth rate of 4.6 percent during the same period. Unfortunately, data from this period were not available for the Nuevo Laredo-Monterrey highway (Mex 85). However, the annual average traffic growth rate from 1987–1989 for this highway was approximately 8.4 percent.

7.1.2 Traffic at International Bridges

Vehicle traffic crossing the international bridges at Laredo-Nuevo Laredo presents some difficulties in both northbound and southbound directions. The major difficulties are the enforcement of customs and immigration regulations and the inappropriate geometry of the street system adjacent to the bridges, both of which result in traffic congestion and delays. In addition,

the size of trucks and the requirements of import/export laws and customs regulations for commercial vehicles contribute to traffic problems at the two bridges.

In 1987, the Texas State Department of Highways and Public Transportation analyzed traffic congestion on the Laredo-Nuevo Laredo bridges (Ref 51). The results of the analysis regarding bridge vehicular capacity were the following: (1) the total of eleven lanes is more than adequate for servicing current and projected traffic volumes; (2) the collection of tolls does not presently limit capacity; (3) all custom booths are not usually manned at unexpected peak load times, which can cause delays; and (4) the street system adjacent to the bridges, except for Bridge No. 2 on the U.S. side, is in poor condition.

The results of this 1987 analysis are still valid. Inspection staffing limits border crossing capacity rather than the bridge capacity itself. The General Accounting Office, in a report to the Chairman of the Senate Finance Committee (Ref 52), pointed out that the insufficient number of Customs and Immigration inspectors is the primary obstacle to the efficient operation of border crossings.

The following tables present recent figures relating to transborder traffic on the Laredo-Nuevo Laredo bridge system. While this information is continually updated by U.S. and Mexican agencies, information regarding both northbound and southbound directions is not recorded by any of the agencies (though the information provided by each is complementary). More attention should be paid to the consistency of the information.

Table 7.2 1988-1991 transborder traffic at Laredo-Nuevo Laredo

	Northbound[1]			**Southbound[2]**		
Year	Pedestrians	Total Vehicles	Freight Vehicles	Pedestrians	Total Vehicles	Freight Vehicles
1988	4,428,528	6,192,971	154,548	3,279,342	6,394,017	171,128
1989	3,834,814	6,931,847	181,630	3,257,874	6,746,464	185,683
1990	4,122,956	7,022,174	190,319	3,188,720	6,464,110	261,067
1991	4,342,873	6,946,510	178,151	3,217,944	6,715,601	346,524

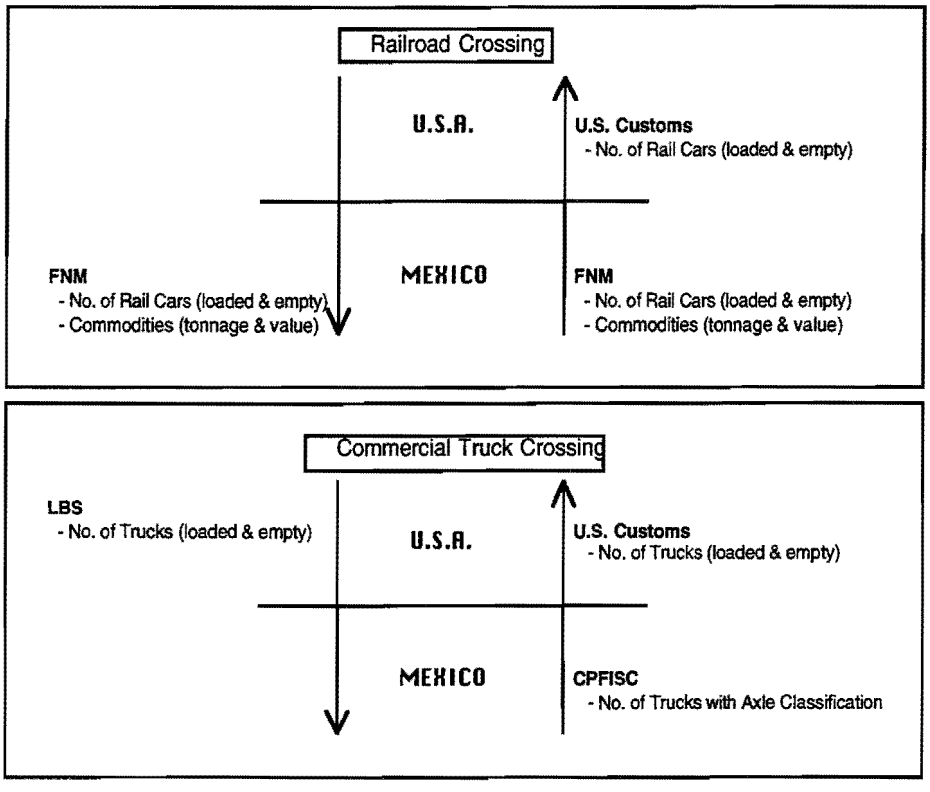
NOTE: [1] U.S. Customs Port of Laredo, based on fiscal year statistics
[2] Laredo Bridge System, based on calendar year statistics

Figure 7.3 shows the agency names and the type of data recorded for transborder commercial rail traffic and truck traffic. Figure 7.4 shows the increase in northbound and southbound loaded-truck traffic. From 1986 to 1991, the annual average traffic growth rate was 7.7 percent and 25 percent for northbound and southbound loaded trucks, respectively.

Table 7.3 1987-1989 northbound vehicle traffic statistics

Calendar Year	Autos	Buses	Trucks	Total
1987 Bridge No. 1	2,362,114	7,452	132,000	2,501,566
Bridge No. 2	2,876,665	510	129,268	3,006,443
Total	5,238,779	7,962	261,268	5,508,009
1987 Bridge No. 1	2,325,556	6,759	169,747	2,502,062
Bridge No. 2	3,345,760	523	174,654	3,520,937
Total	5,671,316	7,282	344,401	6,022,999
1989 Bridge No. 1	2,390,952	6,063	123,547	2,520,562
Bridge No. 2	3,497,530	268	368,149	3,865,947
Total	5,888,482	6,331	491,696	6,386,509

Source: Caminos y Puentes Federales de Ingresos y Servicios Conexos, Mexican Toll Authority



FNM - Ferrocarriles Nacionales de Mexico
CPFISC - Caminos y Puentes Federales de Ingresos y Servicios Conexos
LBS - Laredo Bridge System

Figure 7.3 U.S. and Mexico agencies that keep record of transborder traffic

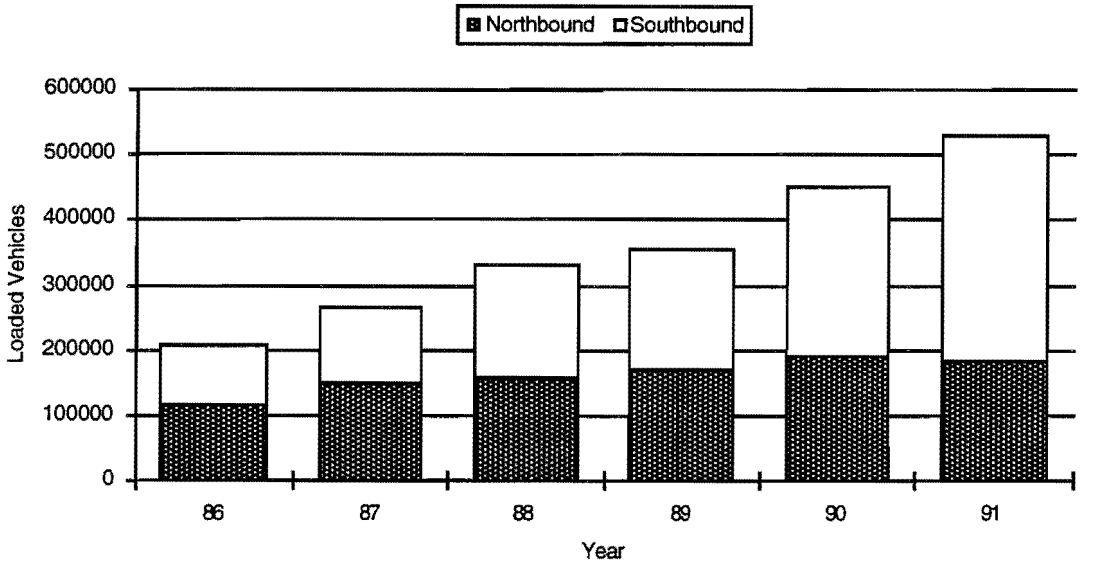


Figure 7.4 Transborder loaded truck traffic at Laredo-Nuevo Laredo

7.1.3 Truck Traffic within the Cities

While truck traffic is a key element in the economic livelihoods of Laredo and Nuevo Laredo, both cities have attempted to segregate truck routes. In designating specific routes for truck traffic, both cities have attempted to keep trucks off city streets not geometrically and structurally designed for commercial truck traffic. Yet despite the existence of the truck routes, the area's mixture of commercial, industrial, and residential land tends to generate a continuous flow of truck traffic combined with passenger vehicle traffic. One way to resolve this situation is to move the commercial traffic flow and associated activities outside the downtown area, an approach that both cities are planning to implement.

7.2 COMMERCIAL TRAFFIC PROBLEMS WITHIN THE AREA

There are two conflicting interests associated with traffic issues within this area. One, at the international level, seeks to expedite transborder commercial traffic by providing transportation infrastructure that will bypass the current inefficient infrastructure of Laredo-Nuevo Laredo. The other, at the local level, opposes the idea of diverting traffic away from the downtown area (as in the case of the Laredo-Colombia Bridge), since much of the area's economic activity relies on through truck traffic and its related transportation operations.

Both cities—especially their downtown areas—are experiencing problems associated with increasing transborder commercial traffic. The bridges have permitted a tide of commercial traffic to pour through the narrow street systems, causing pavement deterioration, accidents, congestion, and pollution. Local authorities, aware of the effects of commercial traffic on city streets, are scrambling for ways to address the problem. Among other solutions, they are considering, in their

infrastructure improvement programs, the construction of two international bridges (and the beltways that would link them) as an area-wide transportation solution.

Effective transportation programs require a comprehensive analysis of transportation demand and, based on that, a realistic transportation planning process. In the case of the Laredo-Nuevo Laredo area, policymakers should consider a complete freight transportation planning process at either the regional or corridor level.

7.3 SUMMARY

This chapter analyzed vehicle traffic on major highways, traffic at international bridges, and truck traffic within the area. It also addressed commercial traffic problems. The following chapter discusses commercial traffic forecast issues, including causes of commercial traffic increase, factors that may affect future transborder traffic flows, data sources and data availability for the freight transportation planning process, and a methodology that could be used to estimate future commercial traffic.

CHAPTER 8. COMMERCIAL TRAFFIC FORECAST

The rise in commercial truck traffic in the Laredo-Nuevo Laredo area has led to truck flows, truck sizes, and truck weights that are potentially damaging to the area's transportation infrastructure. Such developments have, in turn, forced changes regarding highway system capital investment needs, maintenance requirements, cost allocation among users, and highway finance. With respect to non-highway modes, the primary concerns are, first, how these changes in the use of non-highway modes could affect the highway system, and, second, how the changes in the cost or services provided by these modes could affect the state and/or local economy.

This chapter presents a freight-demand-analysis methodology capable of forecasting import/export traffic flows through the Laredo-Nuevo Laredo area (and which could be used to assess the impact of commercial traffic on the state highway system and the transportation system within this region). In addition, this chapter explores the data acquisition for the freight-demand analysis.

8.1 CAUSES OF U.S.-MEXICO COMMERCIAL TRAFFIC INCREASE

The increase in U.S.-Mexico commercial traffic can be seen, in large part, as the result of the following Mexican initiatives:

- Mexico's economic policy changes
- Mexico's industrialization strategy and foreign trade liberalization policy
- Mexico's reduced trade barriers and its entrance into the GATT

Also certain to accelerate transborder trade is the proposed North American Free Trade Agreement (NAFTA), a trade pact that would gradually eliminate all tariffs on trade between the U.S., Canada, and Mexico. Presently under negotiation (April 1993), NAFTA, if ratified by the legislatures of all three countries, is scheduled to take effect by January 1, 1994.

8.2 FACTORS THAT AFFECT FUTURE COMMERCIAL TRAFFIC FLOWS

Estimating future commercial traffic flows across the U.S.-Mexico border requires identifying all the factors that could affect such traffic. This is especially important when conducting the kind of local analysis that we undertook in this study. Transportation system elements that should be considered include available modes, infrastructure and service development, service rates, and regulations (e.g., truck size and weight regulations, accessibility of trucks to Mexico and the U.S.). Research should also focus on economic trends related to trade, since commodity type has a great impact on traffic growth. Thus, this study identified and analyzed the following major factors affecting present and future commercial flows through the Laredo-Nuevo Laredo area:

Transportation Infrastructure Development: Mexico is undertaking an ambitious highway construction program to facilitate the movement of travelers and goods throughout the country. With respect to the Laredo-Nuevo Laredo area, an important infrastructure development is the nearly completed Monterrey-Nuevo Laredo toll highway, including an adjunct toll highway that will link it with the Laredo-Colombia Bridge. Mexico is also upgrading its port system as part of a plan to make its shipping centers more competitive with international ports. For example, improvements to the Port of Veracruz are being strongly promoted by Mexico, since that port directly affects commercial flows through Nuevo Laredo. Finally, the intermodalism funding provided by the Intermodal Surface Transportation Efficiency Act of 1991 will certainly change the transportation system, though in what ways is not clear at this point.

Transportation Service Development: Several developments are now underway in Mexico to improve service. For example, ports in Mexico, increasingly oriented towards intermodalism, have attempted to improve levels of service by supporting containerization. And Ferrocarriles Nacionales de Mexico (FNM) is now negotiating with U.S. railway companies to improve existing services and to provide new ones throughout the country. At Laredo, the Union Pacific Railroad Company is working with FNM to improve rail services on routes from Nuevo Laredo to central Mexico.

NAFTA contains provisions for transportation services that will allow increasing motor carrier access to all of North America. A possible outcome of these provisions will be a decrease in traffic (i.e., motor carrier operation will be improved, since the present high rate of empty back-haul operations will be minimized under NAFTA).

Transportation Regulations: Possible changes in truck size and weight regulations under NAFTA also will affect commercial traffic flow.

Economic Trends: Economic trends associated with commercial flow through Laredo-Nuevo Laredo must be analyzed, insofar as the type of commodity produced (a function of public demand) will have a great impact on the transportation service or mode of transportation required. Under NAFTA, the trading of commodities not subject to tariffs (or whose tariffs are being phased out) is expected to increase more rapidly than the trading of unaffected commodities.

8.3 FREIGHT TRANSPORTATION PLANNING PROCESS

The freight transportation planning process is divided into the four phases: (1) freight generation, (2) freight distribution, (3) modal division, and (4) traffic assignment. The process used here is conceptually related to the urban transportation planning process (there are, however, substantial differences in both application and data availability).

Freight generation involves estimating the amount and location of originating and terminating freight movement. It can include the full complement of freight movement, or it can be restricted to a subset of movements by area, economic sector or industry, commodity type, and transport modes or services used.

Freight traffic distribution involves estimating vehicle interchanges or commodity flows between the origins and destinations identified under the freight traffic generation phase.

Movements can be classified into three groups: (1) origin and destination within the study area, (2) origin or destination within the study area, and (3) origin and destination outside the study area.

(Freight generation and distribution are combined when commodity flow data are used to estimate base-year traffic origins, destinations, and flows. When simulation techniques are employed to estimate these outputs, freight generation and distribution are treated separately.)

Modal division is the process of splitting commodity movements among competing modes. Models of the mode-choice, decision-making process are based on comparable transport cost, price, or logistics cost as the primary means for dividing traffic among competing modes. Traffic assignment converts commodity flows into vehicle flows, and then allocates the resulting vehicle interchanges to the transportation system.

8.4 FREIGHT DEMAND ESTIMATION

The first two phases of the freight transportation planning process are also known as freight demand or generation. To the transportation planner, the terms "demand" or "generation" mean the aggregate amount and composition of freight generated by the economy. It represents the movement of raw materials, agricultural goods, and manufactured products via the nation's transport facilities. The driving forces behind demand (or generation) are industrial production and personal consumption.

State freight-demand estimation is closely linked to state and regional economic activity forecasting. Hence, it is essential to have a general understanding and awareness of the relationship between transport demand and the state's industrial production and consumption (as measured by major commodity groupings and geographic location, trade relationships with industries in other states, and long-term changes in industrial location, technology, and economics).

Economists work with dollar representations of inter-industry transfers, primarily in the manufacturing sectors of the economy. Transportation planners, however, are concerned with the physical transfer of goods, measured in tons. It is important to understand both sets of data and the methods for establishing linkages between the two data sets.

Because changes brought about through technology and economic trends are so difficult to predict, most freight demand forecasts are for short-term periods (up to 10 years).

8.4.1 Data Availability

In most states, the collection of truck traffic flow data, including the preparation of freight demand forecasts, is assigned low priority. Current and historical vehicle flow data by truck size are available from classification and volume counts taken on a periodic basis at sample locations. Data on truck gross and net vehicle weights are usually not available, except at a very limited number of locations.

Many states have permanent weigh stations that are regularly used to weigh trucks for enforcement purposes. Usually, the weight data obtained are not retained in a form suitable for statistical analysis and summarization. Although most states maintain manual records of the

trucks weighed and citations issued, we are not aware of any automation of the record-keeping process. Moreover, data regarding a vehicle's origin or destination, or the type and weight of the commodities being carried, are not usually collected.

Future truck volumes are customarily forecast as a percentage of aggregate traffic volumes. The truck percentage typically applied to total traffic is usually determined from historical data rather than from any detailed examination of economic growth or projected truck movement. Thus, the forecasts are prepared using trend extension forecasting techniques rather than by relating observed volumes with present economic trends, and then preparing a forecast based on economic projections. The shortcomings of truck-oriented freight demand forecasts stem from a lack of data.

8.4.2 Methodology

The objective of this methodology is to estimate import/export commodity flow for the selected base year and forecasts. (The use of forecasts of imports/exports by commodity made by economists is recommended.) The following include the relevant guidelines for estimating freight demand:

- Define the unit of measure, normally expressed in tons or vehicles equivalents made over an extended period of time (one year)
- Define the geographic space (e.g., statewide or corridor)
- Define general orientation (e.g., modal or commodity)
- Prepare forecasts of commodity production and consumption (in addition to assembling comparable base year information).
- Prepare forecasts of vehicle or commodity flows or distribution (in addition to assembling comparable base-year information).
- Define the measure of performance in physical or impact terms. (Physical performance involves measuring and comparing commodity or vehicle flows. Impacts are simply the projected effects of anticipated changes in vehicle flows in comparison with the base case and relevant standards.)
- Consider the following assumptions for short-range forecasts:

  Aggregate freight demand is price and service inelastic.

  Freight traffic generation is independent of the factors determining the division of traffic among the modes.

  Freight traffic forecasts are dependent upon the anticipated amount and location of commerce.

  Products produced by agriculture, manufacturing, and mining establishments will eventually be transported and consumed.

- Assemble the base-case commodity flow matrix.

There are two ways of assembling the commodity flow matrix based upon the availability of data: (1) If vehicular origin-destination or commodity flow data are available, those data should be used as the basis of the base-year commodity flow matrix (even if the data are incomplete, they can be supplemented by other data to produce a satisfactory product); and (2) if vehicular origin-destination or commodity flow data are not available, simulation techniques should be used for freight generation and distribution. The use of existing data is preferable to simulation techniques, since such techniques generally cannot effectively replicate local conditions.

Assembling a Commodity Flow Matrix

A. Using existing data

1. Disaggregate geographic data—Origin. Consider first movements involving manufacturing plants. If the data are aggregated at state level, they can be disaggregated using data on employment by SIC by county.
2. Disaggregate geographic data—Destination. Disaggregate destinations are somewhat more complex because they depend on the characteristics of the receiver rather than those of the shipper. An input-output table would commonly be used for this purpose.

B. Using simulation techniques

1. Freight Generation: Freight shipments and receipts must be estimated either from industry production and consumption information or from other economic data. In general, freight shipments or receipts can be approximated by converting employment or monetary measures of industrial production and consumption into physical units.
2. Freight Distribution: Freight distribution can be simulated by using such synthetic models as (1) trade models, (2) gravity models, and (3) linear programming. Trade models are a means for apportioning production among consuming areas, or, conversely, consumption among producing areas. In gravity models, the flow between producers and consumers is proportional to total shipments and receipts, and inversely proportional to the distance or unit cost of transport between the producer and consumer. Linear programming extends this concept still further by assuming that producers will seek to minimize their transport costs.

8.4.3 Data Acquisition for Laredo-Nuevo Laredo

A basic input required in the freight transportation planning process is commercial traffic origin and destination data—data which, in most instances, are not readily available for this purpose. Origin and destination (O/D) data for commercial traffic not only illuminate questions regarding routing, destination, and type of commodity moved; they can also serve as the basis for assessing future commercial traffic increases and, hence, infrastructure requirements.

There are two ways to acquire this O/D information: (1) obtain primary data by conducting an origin and destination survey (an option that this study explored in examining the Laredo area and that this chapter describes in the following subsection), and (2) access such secondary

information sources as local, state, and federal agencies that record vehicle or commodity flow data.

Primary Data: Origin and Destination Survey

The study attempted to conduct a commercial traffic origin and destination survey at Laredo, Texas. In exploring the various options available, the study team considered locations where official agencies stop commercial traffic for some kind of regulation enforcement. Having identified such points, a study researcher was dispatched to interview truck drivers, asking specific questions regarding the final destination of the cargo, routing, frequency of the trip, and type of commodity transported. The following sections record the results of these survey attempts.

The first option for an origin and destination survey was undertaken at border crossings at Laredo's Bridge No. 1 and Bridge No. 2, and involved interviewing truck drivers crossing into Texas. Visiting the area, the study team learned that, at present, loaded trucks coming into Texas through downtown Laredo use Bridge No. 2 exclusively. Accordingly, this bridge was selected for the survey site, with the U.S. Customs Import Lot serving as an appropriate location for interviewing truck drivers (without disrupting vehicle traffic). As the study team learned, however, the transborder commercial operation particular to this site—specifically its reliance on local drayage companies to move transborder freight—rendered this option useless. (Local drayage companies handle a large percentage of truck traffic crossing the border. These trucking companies pick up trailers from one holding yard in Mexico and then drop them off at another holding yard in the U.S., and vice versa. Local truck drivers carrying out this operation rarely know the final origin and destination of the cargo.)

The Texas Transportation Institute (Texas A&M) recently attempted a similar origin and destination survey of maquiladora truck traffic in seven Texas border cities. In this survey, researchers handed out questionnaires to truck drivers crossing bridges into Texas, asking them to complete the survey questions and then mail in their responses. The subsequent low response rate (19 percent for Laredo, Texas) reflects, again, the presence of the many drayage companies that operate in this area.

A second option was to interview truck drivers at the Border Patrol Check Points—assuming that these locations were far enough from the warehouses and holding areas and that the commercial traffic was engaged in long-haul operations. In this case, the study focused on Border Patrol check points on IH-35 and US 59. At these check points, members of the study group first defined the logistics of the survey and then conducted a pilot survey (to test the proposed questionnaire and to identify potential problems in conducting the truck driver interview). The pilot survey showed that, on average, border patrol officers delay trucks for 5 seconds, forming, in some instances, a queue of seven to eight trucks. At both check points there is only one lane assigned for commercial vehicles, and since participation in the survey was voluntary, border patrol officers asked the drivers if they would be willing to participate. Those drivers choosing to participate pulled out of the traffic lane and stopped the vehicle for the interview. (This operation

was necessary to prevent blocking traffic, considering the interview required, at a minimum, 1 to 2 minutes).

The study team was finally persuaded to abandon this option because of the following reasons: (1) few truck drivers were willing to participate, (2) the area lacked adequate space for trucks to pull off the road for the interview, (3) the noise generated by the running engine (and the difficulty in climbing into the truck to take notes) made the survey impractical, and (4) the existing traffic conditions were hazardous to the surveyors.

A third option for obtaining the origin/destination data for truck traffic involved directly interviewing either U.S. or Mexican Customs officials. Every truck that comes into the U.S. must submit import and export documents that contain addresses of the buyer and seller of the cargo (including city and state information). However, in talking with customs officials, the researchers identified the following obstacles to this option: (1) the documented origin or destination is not necessarily the actual origin/destination of the commodity (i.e., such information could be identifying merely the importer/seller headquarters), (2) since the O/D information in the import/export document is not the main concern for customs, the information could be inconsistent, (3) the information is confidential and, therefore, not available to the public (because it has commodity price information that could be misused by a competing manufacturer). Similar obstacles hampered this survey option effort at the Mexican Customs office.

The fourth option, the one considered the most viable, involved interviewing a sample of trucking companies located at Laredo, Texas, asking specifically for the origin/destination of their operations. For this option, a useful directory of trade handling companies was obtained from the Laredo Development Foundation—a private, non-profit corporation funded by local business and community leaders to promote Laredo's economic development (Ref 53).

Secondary Data: Information Sources

The following table shows the available information on Texas-Mexico commercial flow indicating category, type, level of aggregation, period covered and source of the data.

8.5 SUMMARY

This chapter presented the causes of transborder commercial traffic increase and the factors that may affect the commercial traffic flow at Laredo-Nuevo Laredo. A description of the freight transportation process was presented. A methodology to perform the actual freight demand analysis was proposed. Data sources and availability were explored for Laredo-Nuevo Laredo. The following chapter presents the conclusions of the study.

Table 8.1 Texas-Mexico commercial flow data sources

Category	Information	Level of Aggregation	Years	Source
Traffic	• Northbound Traffic No. of vehicles processed Buses POV's Trucks Rail cars (empty & loaded) Private aircraft -No. of pedestrians	• District • Port of entry • Yearly • Monthly	1986-1991	U.S. Customs' Districts
	• Southbound Traffic -No. of loaded trucks and trailers with freight	• Port of Laredo • Yearly • Monthly	1986-1991	Laredo Bridge System
	• Northbound Traffic -No. of vehicles Passenger Buses Truck classified by no. of axles	• Bridge • Yearly • Monthly	1987-1989	CAPUFE-Mexico
Maquiladoras	• Number of maquiladora plants	• District • Port of entry • Yearly	1988-1991	U.S. Customs' Districts
Revenue	• Revenue from northbound traffic -Duty -MPF -User Fees	• District • Port of entry • Yearly	1988-1991	U.S. Customs' Districts
Economic	• Total U.S. Exports to Mexico -Total $ value of shipment -Total $ value of shipment by air -Weight (kg) of shipment by air -Total $ value of shipment by sea -Total Value of shipment by sea Containerized -Weight (metric tons) of shipment by sea -Weight (metric tons) of shipment by sea containerized	• State • Commodity	1989-1991	National Trade Data Bank University of Massachusetts (MISER)
	• Total U.S. import from Mexico -Cons: Customs ($1,000) -Cons: C.i.f. ($1,000)	• Commodity	1989-1991	National Trade Data Bank USDOC, Bureau of the Census
	• U.S. imports from Mexico ($1,000)	• Commodity (1&3 SITC)	1987-1991	National Trade Data Bank USDOC, International Trade Administration
	• U.S./Mexico freight (tonnage) -Northbound commodity flows by mode -Southbound commodity flows by mode modes: surface, vessel, air	• District • Commodity • Yearly • Mode of transport	1989	Transearch. Reebie Associates

CHAPTER 9. CONCLUSIONS

U.S.-Mexico trade, having grown substantially over the last few years, is set to increase even more dramatically with the expected ratification of the North American Free Trade Agreement (NAFTA). And while this growth in trade will initially lead to further increases in commercial traffic (and, hence, traffic congestion), various NAFTA transportation service provisions could potentially improve the entire transborder commercial process, resulting ultimately in a net *decrease* in traffic congestion.

Because much of the trade will move via surface transportation, effective infrastructure planning and regulation enforcement for ports of entry along the U.S.-Mexico border—specifically in the Laredo, Texas, and Nuevo Laredo, Tamaulipas, area—are required. To be sure, increased U.S.-Mexico trade will mean economic improvement for the Laredo-Nuevo Laredo area; yet it also promises to overburden the already-strained municipal budgets of both cities, as they attempt to cope with initial traffic congestion, pollution, and highway maintenance and reconstruction.

This study recommends that policymakers undertake a freight transportation plan that takes into account future commercial traffic growth in the Laredo-Nuevo Laredo area. Because measures to expedite and to facilitate international commercial traffic certainly will have an impact on the border cities, planners must identify the likely positive and negative effects that increased trade will have upon these border cities, with each port of entry characterized independently. It is also very important that planners study both sides of the border so as to obtain the most accurate assessment of the problem. Both U.S. and Mexican authorities should coordinate their efforts to provide sound solutions to transborder commercial traffic problems.

Thus, the efficient movement of transborder commercial traffic will rely, first, on Mexico's ability to improve its freight transportation system (highway, rail, port, and intermodal), and, second, on future international commercial traffic regulations, such as those to be introduced through NAFTA provisions.

The study identified major factors that affect the flow of commercial traffic through Laredo-Nuevo Laredo. These factors include:

- infrastructure development in the Laredo-Nuevo Laredo area, both in Mexico and in the U.S.;
- development of multinational transportation services in Mexico and in the U.S.;
- NAFTA transportation service provisions that could particularly optimize services in Mexico and in the U.S.; and
- economic trends and their impact on the various modes of traffic.

Finally, a methodology was proposed to forecast import/export traffic flows through the Laredo-Nuevo Laredo area; this methodology can be applied to other border crossings.

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APPENDIX A.

THE SOLIDARITY BRIDGE SYSTEM

APPENDIX A. THE SOLIDARITY BRIDGE SYSTEM

In August 1988, the Governor of Nuevo Leon, Jorge Treviño, with the assistance of the Budgeting and Programming Secretary, Dr. Pedro Aspe Armella, established CODENOR, a commission that would study opportunities for developing the northern portion of Nuevo Leon. CODENOR termed their strategy the 14-XXI plan—so named because the goals were to be achieved over 14 years and, hence, in the 21st century.

As part of the 14-XXI plan, Nuevo Leon submitted to Texas and U.S. officials a proposal for the construction of the Solidarity Bridge at Colombia, Nuevo Leon, and Laredo, Texas. Interestingly, this proposal, which was well-received by U.S. officials, represented the first-ever request by Mexico for U.S. assistance in building an international crossing port.

Once the study area was identified in 1986, the 14-XXI plan took into consideration two major objectives regarding Nuevo Leon:

- Develop northern Mexico (central) along the 372.6-mile (600-km) U.S.-Mexico border.
- Reverse the population growth of the Monterrey metropolitan area by creating alternative locations for the state's industrial development— more specifically, reduce the 4 percent annual population growth rate to a 2 percent annual population growth rate, in order to control industrial growth and to improve the standard of living for Nuevo Leon's population.

A principal element of the 14-XXI plan was the construction of the Colombia-Laredo International Bridge System. This new border-crossing system is located in Colombia, Nuevo Leon, Mexico, and northwest of Laredo, in Webb County, Texas, 31.7 river miles (51 km) north of Laredo International Bridge I, at 99°, 44 minutes, 56 seconds latitude.

14-XXI PLAN DEVELOPMENT STAGES

It is important to stress that the bridge is only one element in a relatively complex development program. Furthermore, individual civil engineering projects like bridges are rarely feasible unless located in areas where demand is already established. In development zones, where demand is low to non-existent, they are economically vulnerable. In such circumstances, it is not unusual to see large infrastructure engineering projects linked to complex complementary investments which, taken as a whole, stimulate the demand for the facility and justify its provision. Accordingly, the 14-XXI plan had several important interrelated investment elements which, taken together, were necessary for its successful implementation.

The investment elements of the 14-XXI plan included:

1. The construction of the International Solidarity Bridge. This introduced a concept in border-crossing design and philosophy that focused on international commerce,

advantageous location of facilities, and regional requirements so as to ensure an efficient flow of goods between Mexico and the United States.

2. The construction of a new highway accessing the city of Monterrey, Nuevo Leon. This roadway will augment the existing highway linking Monterrey, Nuevo Leon, and Nuevo Laredo, Tamaulipas, providing a level of service equivalent to I-35 in south Texas.
3. The construction of the Anahuac-China industrial highway and the strengthening of the local infrastructure in order to bring about urban development in four medium-sized cities in Mexico. Following that, the planning of industrial facilities in those cities and along a 124-mile (200-km) superhighway, which will link the cities of Anahuac, a conurbation between Sabinas and Vallecillo, another conurbation between Cerralvo and General Treviño, and finally one between China and General Bravo. All this would stimulate bridge crossings and use.
4. Intense agricultural and cattle breeding development on 5,060,000 acres (2,000,000 hectares) in northern Nuevo Leon, with the best land resources being given special consideration so as to incorporate for agricultural purposes the greatest usable land, without affecting private stock breeders.
5. Land development oriented toward improving the industry and agriculture of Lampazos and Sabinas Hidalgo, Nuevo Leon.
6. A regional approach or strategy that includes the states of Coahuila and Tamaulipas will bring about greater economic and social progress; will continue the industrial highway north to Coahuila; will affect several localities such as Juarez and Sabinas as well as achieve a conurbation that is similar to the one now developing at Nueva Rosita, Coahuila, Clohete, and Aguajita; and will encompass Nava, Allende, Villa Union, and Zaragoza. Juarez, located near the Venustiano Carranza Dam, may have industrial applications as well as tourist attractions.

To the south, the industrial highway would continue in the direction of the Gulf of Mexico, continuing to Tamaulipas and on up to Valle Hermoso. This construction would establish an intermediate point of development between China, General Bravo, and Valle Hermoso. Also, the industrial highway would join this region (China, General Bravo) to the tourist and fishing industries—an important consideration being the potential of the Madre Lagoon—of Valle Hermoso and San Fernando.

In general, the completed Industrial Highway will help foster the development of nine medium-sized industrial cities along 372.6 miles (600 km) of border with the United States and will be just 37 miles (60 km) to 43 miles (70 km) away from the border in Coahuila, Nuevo Leon, and Tamaulipas.

In order to implement the investment elements, the following priorities were established:

1. the construction of the border port Solidarity (under construction since 1990);
2. the construction of proper access to the bridge;
3. the Anahuac-China Industrial Highway;
4. the intense development of agricultural and stock breeding activities within the region.
5. the creation of alternative points of agricultural and stock breeding development, particularly for Sabinas Hidalgo and Lampazos; and
6. the regional approach associated with the states of Coahuila and Tamaulipas.

This, then, was the preferred ordering of the complementary elements in the 14-XXI plan. To date, only the first has been carried out, which essentially accounts for the dramatic under-utilization of the structure and the resultant financial burden carried by the Laredo Bridge System. The bridge investment is described below.

BRIDGE DESIGN PARAMETERS

The bridge structure was built to carry 82.5 tons (or H20-S16 loads). Bottom-of-bridge beams at support No. 6 are approximately 16 feet (4.87 m) above design flow elevation, giving a flow rate of 5,968 cubic yards (456.5 m^3) per second. The bridge structure consists of prefabricated concrete panels placed on prestressed, prefabricated concrete beams, which are sustained by in-place constructed supports on concrete pilings. Supports are designed to provide minimum obstruction to flow (they are aligned parallel to flow). The bridge embedding includes concrete paving that slopes at no more than a 3-to-1 vertical ratio (3:1). The concrete slope paving protects the bridge from erosion at the embeddings.

Horizontal clearance requirements (the distance from the river's flood level to the bridge's bottom structure) are in conformity with the free board requirements of the International Boundary and Water Commission (IBWC). As directed by the IBWC, provisions were also made for an international boundary monument.

The general design specifications for the bridge structure include the following:

Crossing configuration	Simple span bridge
Gross Width	113.5 ft (34.6 m)
Length	456.3 ft (139 m)
Road Surface Elevation (at support No. 6)	458.3 ft (139.6 m)
Total Traffic Lanes	8 (4 each direction)
Walkways	2 @ 6 ft (1.8 m)

The bridge structure was completed in July 1991 and was opened to traffic in August 1991.

COMPLEMENTARY MEXICAN INVESTMENTS

On the Mexican side of the border, the new International Solidarity Bridge is complemented by a complete urban system designed to ease the international movement of traffic and goods. The three fundamental parts are as follows:

1. facilities for the International Commerce Center, with 840 acres (332 hectares)
2. city of Colombia, with 506 acres (200 hectares)
3. an ecological reserve of 1,265 acres (500 hectares)

The International Commerce Center encompasses two major components: (1) federal facilities and (2) complementary areas.

Federal Facilities. The federal facilities were designed to create a modern and efficient crossing point between Mexico and the United States, and to ensure that capacity and efficiency on both sides of the border would be similar.

The federal facilities, developed over an area of approximately 99 acres (39 hectares), are composed of a Customshouse, a fiscal import lot, a fiscal export lot, strategically located check points to facilitate operations using the appropriate control, and a railroad station (with a passenger station and platforms properly equipped to handle and to store goods carried in containers). The custom facilities were designed to serve up to 4,000 trailers a day in both directions.

Complementary Areas. The complementary areas, operated by the private sector, are needed to expedite the flow of goods across the border. These facilities include the following:

- Transportation Terminals in four types:
  - Large.....161,464 sq ft (15,000 m^2)
  - Medium.....80,732 sq ft (7,500 m^2)
  - Small.....37,675 sq ft (3,500 m^2)
  - Common Terminals (by lease or rent)

- Warehouses:
  - Fiscal warehouses
  - Transfer warehouses for the export industry
  - Consolidation warehouses for import commerce
  - Freezer warehouses for the storage of frozen products
  - Wholesale commercial warehouses (import-export)
  - Various

- Groups of Services, which support international commercial activity:
  - Custom agencies (brokers)
  - Security agencies
  - Professional services office

Banks and financial services
Specialized stores
Gas and diesel stations
Maintenance and parts-sale workshops
Hotels
Convention centers
Stock yards for importing and exporting cattle

The Center for International Commerce has all the basic services required, including a pavement structure.

This demonstrates the scale of the border crossing site and the ample opportunity for traffic growth and provision of advanced technological systems for customs inspections and other federal examinations. However, the demand for such a facility is predicated on the availability of highway links within the main trade corridor. And infrastructure alone is merely a necessary but not sufficient condition for economic success. Brokerage, shipping, and federal agencies like customs must be willing to locate to the new site. This demonstrates the clear need for multi-entity planning—an area sadly neglected in the case of the Solidarity Bridge.

PLANNING ISSUES AND CONSIDERATIONS

The Solidarity Bridge was never proposed as a single engineering project. Rather, it was an integral element of a large regional development program whose success depended on the sequencing of a number of projects. At this time, the Solidarity Bridge remains in splendid (but costly) isolation from the rest of the regional highway infrastructure. Its links with Laredo are being currently strengthened with the increased capacity of the Mines Road, but this is the only positive investment that is actually being implemented. The toll road link from the bridge to I-35 remains mired in the planning process, complicated by local politics and interests. To the south, there is still no sign that the link to La Gloria is becoming a reality, although it would not be an immensely costly or lengthy project.

The lessons to be learned are somewhat obvious but worth restating: Unless all the complementary elements of a development plan are undertaken, there will be economic distortions and inefficiencies. And where a border separates a development corridor, one neighbor should invest in complementary elements only if such investments are matched by the sequencing required by the other neighbor. This has not occurred with the Solidarity Bridge, and it is simply not sensible to continue improving linking infrastructure in the U.S. without matching links in Mexico. As always, it is a question of sequencing and timing.